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ABSTRACT

The purpose of this study was the identification of effective means of educating the general public to think in terms of the metric system. Toward this end, extension home eoncomists in New York State were surveyed concerning their plans to implement teaching of the metric system. A literature review was conducted over four basic topics: (1) experiences of other nations adopting the metric system, (2) recent changes of a similar nature (e.g., Britain's adoption of decimal currency), (3) the role of change agents, and (4) characteristics of adult learners. The major findings involved the importance of using mass media in educating the public. Several suggestions to Cooperative Extension Services are provided. (SD)

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ADOPTION OF THE METRIC SYSTEM BY CONSUMERS: A PROGRAM FOR NEW YORK STATE COOPERATIVE EXTENSION

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University for the Degree of

Master of Professional Studies (Communication Arts)

by

Constance Coburn Adams

June 1975

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BIOGRAPHICAL SKETCH

Constance Coburn Adams was born in Rutland, Vermont on January 2, 1934. She graduated from Rutland High School and in 1955 she received a Bachelor of Science degree in home economics from the University of Connecticut at Storrs.

From 1955-1961 the author was employed on a research project in the former Department of Household Economics and Management, New York State College of Human Ecology, Cornell University. From 1961-1973 she was a home economist and program leader for consumer education with Cooperative Extension in Dutchess County, New York. In September 1973 the author entered the graduate program in the Department of Communication Arts, where she held a teaching assistantship. Upon completion of her graduate study, she became a member of the Extension faculty in the Department of Design and Environmental Analysis, New York State College of Human Ecology.

In 1972 the author received the Distinguished Service Award from the National Association of Extension Home Economists. She is a member of Phi Upsilon Omicron, Epsilon Sigma Phi, and Phi Kappa Phi. She is listed in Who's Who of American Women and The World Who's Who of Women.

She belongs to New York State Association of Extension Home Economists, National Association of Extension Home Economists, American Home Economics Association, American Council on Consumer Interests, and U.S. Metric Association.

DEDICATION

To Liebschen

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CHAPTER I

INTRODUCTION

The United States in a Metric World

Over 90 percent of the world's population uses the metric system of measurement. The only nations which are not yet metric or which have not made an official commitment to go metric are: Brunei, Burma, Liberia, Yemen Arab Republic, Yemen People's Democratic Republic, and the United States of America (Metric Assn. Newsletter, Aug, 1974, p. 3).

The metric system originated in France in 1790, but did not become mandatory there until 1840. During the middle and last half of the 19th Century, most nations of Europe and Central and South America adopted it for commercial use. The Soviet Union and China joined the metric users following World War I. In the last few years India and Japan completed their conversion to metric units.

By the early 1960's, practically all nations, with the exception of United Kingdom, Australia, New Zealand, Ireland, South Africa, Canada, and the United States, were using or changing to the metric system. In 1965, the government of Great Britain announced that British industry would change to the metric system and planned 10 years for the changeover. In 1971, in the midst of going metric, Great Britain decimalized its currency.

The Irish Republic is scheduled to complete its changeover by 1975. South Africa plans on being about 85 percent metric by 1975. New Zealand's conversion to the metric system is underway. In 1970, Australia embarked

on a 10-year changeover, with 70 percent completion anticipated by 1976. Canada has just begun implementation of the metric system.

How long can the United States be the only major country different from the rest? As Former Secretary of Commerce Maurice H. Stans said when the report, A Metric America--A Decision Whose Time has Come, was released to the U.S. Congress in 1971:

> ...a metric America would seem to be desirable in terms of our stake in world trade, the development of international standards, relations with our neighbors and other countries, and national security (Bielefeld, 1973, p. 4).

Eventually, the United States will join the rest of the world in the use of the metric system as the predominant method of measurement. The question is--when?

Two Centuries of Debate

According to Gordon (1970, p. 174), "One of the strangest chapters in the history of American legislation was the failure of Congress to enact a comprehensive weights and measures law." One of the articles of the U.S. Constitution provided that Congress shall have the power to fix the standard of weights and measures. The U.S. has repeatedly considered the question of going metric; yet as the nation's bicentennial approaches, no decision has been made.

The customary measurement system currently in use in the U.S. is almost the same as that brought by the colonists from England. It is a hodgepodge of measures derived from a variety of cultures--Babylonian, Egyptian, Roman, Anglo-Saxon, and Norman French. Over the years, some of the more important units had been standardized. For example, early records state that an inch was defined as the length of "three barleycorns, round and dry." However, standards differed among the 13 colonies. Thus, our founding fathers recognized that the customary system was makeshift.

In his first message to Congress in 1790, President Washington urged that it was time for the U.S. to set its own standards of weights and measures. Thomas Jefferson, then Secretary of State, was requested by Congress to prepare a plan for establishing uniform weights and measures in the U.S. He had previously developed the decimal system of currency which was adopted in 1785.

Jefferson came up with two plans; the first followed the English system, while in the second plan he proposed using the same decimal ratio already established for coins. The decimal plan was similar to the metric system being developed at that time in France, with which Jefferson was familiar. Jefferson's decimal plan would have retained some of the old names for frequently-used units. However, Congress took no action.

In 1816, President James Madison reminded Congress that uniform weights and measures legislation had not been passed. Secretary of State John Quincy Adams was asked to reinvestigate the matter. In 1821 he submitted his classic report--the first U.S. metric study. In spite of the many advantages of the metric system, there was one big disadvantage--namely that the system had not yet become popular in France. So, he presented Congress with a choice of four alternatives. In the meantime, most states had enacted their own weights and measures legislation, specifying the English units. The time was not right to encourage adoption of the metric system. It was not until 1838 that Congress ordered the Secretary of the Treasury to establish a uniform system of weights and measures throughout the U.S. These standards were quickly adopted by all the states.

A brief flurry of interest in the metric system in the 1850's, when it was spreading throughout Europe, was cut short by the Civil War.

In 1863 President Lincoln formed the National Academy of Sciences. ears later a committee issued a report favoring adoption of the metric m. In 1866, the use of metric weights and measures was legalized by ress. The metric system was not being made compulsory; rather, Congress rmitting its use.

In 1875, the U.S. was one of 17 countries signing the Treaty of the . The treaty reformulated the metric system and refined the accuracy s standards. The new measurement standards, including meter bars and ram weights, were completed in 1889 and the U.S. received its copies. standards became the nation's "fundamental standards" of length and The yard, pound, and other customary units were defined as fractions standard metric units. The U.S. became an "officially" metric nation, here was no immediate effort to convert the U.S. to metric.

Over the years, many bills dealing with the metric system have been and debated. The subject was kept alive by support from scientists, tors, and some government officials. The opposition became better ized and more effective.

In 1957 the Soviet Union launched the first Sputnik satellite, usher- a new era of science and technology. The desirability of increasing e of the metric system, the predominant measurement language of science, riously considered. A U.S. Army regulation established the metric m as the basis for weaponry and related equipment.

The metric system was refined in 1960 by a General Conference of s and Measures, in which the U.S. participated. Although the metric was a common language of measurement, many dialects had developed the years. These discrepancies were ironed out and the result became ternational System of Units (SI)--the modernized metric system. Fur- refinements were made in 1964, 1968, and 1971.

In 1965, Great Britain's announcement of its intention to adopt the metric system made it very clear that the U.S. would be one of the few nations still adhering to the customary system. After much effort, the Metric Study Act (Public Law 90-472) was passed in 1968. This bill called for a three-year feasibility study, which the Secretary of Commerce was authorized to conduct, to determine the impact of increasing use of the metric system on the U.S.

Going Metric: What Would it Really Mean?

The U.S. Metric Study Report (1971, p. 45) states:

> The main reason going metric has been so controversial in the past is that it was never clear what the debate was really all about. Some people assumed that it would mean an abrupt and mandatory changeover: at some specific date in the near future the inch and the pound would be outlawed. People at the other extreme viewed it as a painless and casual drift toward the use of more metric measurements at little cost or inconvenience.

The proposed metric conversion bill calls for a 10-year conversion period, during which the U.S. would become predominately, though not exclusively, metric. A National Metric Conversion Board, made up of representatives of all major sections in society, would be established to develop a timetable and coordinated plan for implementing an orderly transition. The purpose of having a planned program is to reduce the period of coping with two systems and to keep the cost of conversion to a minimum.

Costs would lie where they fall; in other words, there would be no government subsidies. The rule of reason would also apply; that is, some measurements and some dimensions would never need to be changed. Railroad tracks would stay the same, for example, and it would be unnecessary to change the length of football fields. The changeover would be voluntary for the private sector, but compulsory for government. Each industry and each

company within a particular industry could decide how much metrication to undertake. The International System of Units (SI) would be followed.

Consumers could expect to pass through three progressive stages in going metric: 1) dual labeling, 2) soft conversion, and 3) hard conversion.

In the dual labeling stage, no change occurs. For example, package contents would be stated in both customary and metric units. Ideally, this stage should be as brief as possible; otherwise, people tend to rely on the old (customary) and ignore the new (metric).

During the soft conversion stage, one measurement language is traded for another. Products would remain the same size, but their contents would only appear in metric.

The long range goal is hard conversion, which involves altering sizes, weights, and other dimensions of objects. For example, if the dairy industry sells milk by the liter (slightly more than a quart), the machinery would need to be modified to fill a larger container. Impractical or obsolete sizes could be discontinued and sizes, weights, etc. could be converted to even amounts (such as 300 grams rather than 305 grams), thus achieving convenience and simplicity in the marketplace.

Definitions of Terms

Metric system: Developed in France at the time of the French Revolution, this decimal system of measurement was based primarily on the meter, a length defined as a small fraction of the earth's circumference. Since then the system has been refined in many ways. The up-to-date version is called Le Système International d'Unités (International System of Units) or International Metric System.

International System of Units (SI): The current system is founded on seven base units: the meter as the unit of length, the kilogram as the

unit of mass (commonly called "weight"), the second as the unit of time, the ampere as the unit of electric current, the kelvin (which in common use is translated into the degree Celsius, formerly called centigrade) as the unit of temperature, the candela as the unit of luminous intensity, and the mole as the unit of amount of substance. All other units, such as the liter (volume) are derived from the base units; liter is a special name for the cubic decimeter. Standard prefixes are added to give names for quantities of a particular unit that differ by multiples of 10; for example, meter (m), kilometer (1000 m), millimeter (0.001 m). Symbols for SI units are the same in all languages, even though the SI unit names are spelled differently in the various languages. "Meter" and "liter" may be spelled "metre" and "litre" to conform with the international English spelling; both spellings are considered to be acceptable.

Customary system: The predominant measurement system in the U.S., the customary system includes such commonly-used units as inch, foot, yard, mile, pint, gallon, bushel, ounce (fluid and avoirdupois), pound, and degree Fahrenheit. It is often referred to as the "English system" or the "U.S. system." These are not to be confused with the "Imperial system" (a related, but not completely identical system) which has been used in the United Kingdom and other English-speaking countries, but is being abandoned in favor of the metric system.

Metrication: This is the British term for going metric, metric conversion, metric changeover. All of these terms are synonymous and mean a national changeover that would result in acceptance of metric as the preferred system of measurement and, ultimately, thinking primarily in metric terms instead of primarily in customary terms.

Mass versus weight: Mass is a measure of the amount of materials that an object contains. Weight in science and engineering has frequently been used as a measure of the force of the earth's gravity on an object. Weight differs as a result of gravity, whereas mass is consistent. It is necessary to know whether mass or force is intended and to use the proper SI unit--kilogram for mass, and newton for force.

United Kingdom versus Great Britain: The term Great Britain applies politically to England, Scotland, and Wales; United Kingdom consists of Great Britain and Northern Ireland. In the literature, Great Britain appears more frequently, although technically, the British metric scheme applies to the United Kingdom. Both terms are used interchangeably.

CHAPTER II

MOVING TOWARD METRIC

The Current Situation

Even though America is not yet officially committed to going metric, in reality the U.S. is drifting into metric in a haphazard, piecemeal manner, rather than converting to the metric system via a carefully-planned transition.

About 15 percent of American industries are already operating on the metric system (Perica, 1974, p. 1). These include major corporations such as International Business Machines, Honeywell, General Motors, International Telephone and Telegraph, Ford Motor Company, Xerox Corporation, John Deere, and General Mills. Their actions will undoubtedly have a tremendous impact on their numerous suppliers and will most likely serve as a catalyst for many other corporations.

The Ford Pinto and Mustang II have metric engines (the first produced in the U.S.). The pharmaceutical industry has used the metric system for more than 18 years. As a result, consumers buy prescription drugs in metric units. Sports enthusiasts are familiar with the 100 meter track and the 50 meter swimming pool. Skis are measured in centimeters. Photographic film comes in 35 millimeter, 16 millimeter, and 8 millimeter sizes. Eyeglasses are measured in millimeters; a size 50 frame means that the horizontal dimension of the glass is 50 millimeters long. Sewing patterns are marked in meters and centimeters as well as in yards and inches. Some states

(e.g., Ohio, Michigan, Washington, Vermont) have introduced kilometers on interstate highway signs; the National Park Service has also begun this practice (e.g., Colonial Parkway in Virginia). Over 50 percent of packaged food products are now carrying metric weights, and nutritional labeling information is in metric. Those who travel by air have learned that the 44-pound luggage limit for economy class is equivalent to 20 kilograms.

Measurements for time (second, minute, hour) are already part of the metric system, as are the terms for electric current (ampere, volt, watt).

In June 1972 the Home Economics Research Journal decided that, because of the imminent change to the metric system, use of metric units should be encouraged in reporting research in the Journal. The following policy statement was adopted by the editorial board and advisory committee:

> The metric system should be used whenever feasible; but if not appropriate, the customary system may be used with an interpretation to the metric system (Purchase, 1972, p. 134).

In cooperation with Pennsylvania's Bureau of Standard Weights and Measures, Sun Oil Company is testing motorists' reactions to purchasing gasoline by the liter instead of the gallon. Half of the gas pumps at a Sunoco station in Willow Grove, Pennsylvania have been converted to dispense gasoline by the liter. A conversion chart is located at the pump to acquaint the consumer with the difference in measures. Motorists are being surveyed at the time of purchase to determine whether they were confused or upset by buying gasoline in liters instead of gallons. After several weeks, these results have been released by Sun: 1) about one-fourth of the motorists said they were in favor of the change; 2) more than half said the change to liters made no difference to them; 3) about 15 percent opposed the change; and 4) about 5 percent said they "didn't know." A second survey will be conducted later to determine any change in motorist attitude (Metric News, Nov./Dec. 1974, p. 10; and Metric Assn. Newsletter, Nov. 1974, p. 3).

The U.S. Consumer Product Safety Commission has included metric dimensions in some of its new regulations. For example, every bicycle sold after January 1, 1975 must be labeled to indicate that it meets the Commission's safety standards. The measurements for the label or hangtag are given in centimeters. The Commission also uses metric units followed by customary units in parentheses in the Federal Register for proposed safety regulations (Metric News, Nov./Dec. 1974, p. 24; and Metric Assn. Newsletter, Aug. 1974, p. 3).

The Seven-Up Company has announced plans to market 7UP in metric volumes, beginning early in 1975. The present half-quart and quart containers of regular and sugar-free 7UP will be replaced by half-liter and liter returnable and nonreturnable bottles. Later, nonreturnable bottles are expected to be available in 300 milliliter, 1.5 liter, and 2 liter sizes. The company will recommend to local bottlers that the metric containers be priced the same as competitors' quart and half-quart sizes, even though the metric bottles will contain six percent more drink (Metric Reporter, Nov. 15, 1974, p. 1).

Beginning with the January 15, 1975 issue of Consumer News, published by the Office of Consumer Affairs, Department of Health, Education, and Welfare, units of measurement for weights, distances, temperatures, and dimensions will be given in metric (Consumer News, Jan. 15, 1975, p. 2).

The National Weather Service (NWS) of the National Oceanic and Atmospheric Administration has approved plans to implement metric units in dissemination of weather information. The target date for changing temperature and air pressure was to be September 1, 1975, provided that the Metric Conversion Act had been approved by the 93rd Congress (Metric Assn. Newsletter, Aug. 1974, p. 3).

By January 1, 1979, the wine industry, both foreign and domestic, will merchandise all wine in seven standard metric-sized bottles: 100 milliliter, 187 milliliter, 375 milliliter, 750 milliliter, one liter, one and one-half liter, and three liter. The changeover will begin immediately, but will not become mandatory until the established date (Metric News, Jan./Feb. 1975, p. 10).

Even Charles Schulz's "Peanuts" comic strip recently included a three-day series on the metric system! (See Appendix.)

Though far from exhaustive, these examples illustrate that the U.S. is already going metric.

Status of Legislation

In 1971, former Secretary of Commerce Stans presented to the Congress the results of the three-year study of the advantages and problems of adopting the metric system. His recommendations (A Metric America: A Decision Whose Time has Come, 1971, p. iii) included:

- That the United States change to the International Metric System deliberately and carefully;
- That this be done through a coordinated national program;
- That the Congress assign the responsibility for guiding the change, ...to a central coordinating body responsive to all sections of our society;
- That within this guiding framework, detailed plans and timetables be worked out by these sectors themselves;
- That early priority be given to educating every American schoolchild and the public at large to think in metric terms; ...
- That the Congress, after deciding on a plan for the nation, establish a target date ten years ahead, by which time the U.S. will have become predominantly, though not exclusively, metric;
- That there be a firm government commitment to this goal.

Federal Legislation

As a result of these recommendations, several bills dealing with metrication have been introduced in Congress. In August 1972, the Senate unanimously approved a metric conversion bill. However, no such action was taken in the House of Representatives, so the bill died with the closing of the 92nd Congress.

In the 93rd Congress, 12 metric bills were introduced in the House and one in the Senate, along with two joint resolutions. On May 7, 1974 HR 11035 got stalled in the House of Representatives because of the unusual "suspension of rules" procedure; a motion was defeated to suspend the rules to consider metric conversion legislation without any amendments being attached, and the event received a great deal of publicity. The amendments would have allowed subsidy payments to labor for tool purchases and low interest loans to small business (Metric News, May/June 1974, p. 38).

As stated in Metric News (Jan./Feb. 1974, p. 35):

> The choice before the Congress is not whether we should move to the metric system. That conversion has already begun. The choice is between continuing the conversion process in an entirely uncoordinated fashion, as is the case now, or going forward with the conversion process on a coordinated basis.

Hopefully, the 94th Congress will resolve this issue.

Congress, however, has gone on record "as believing that the SI system of units will become the dominant system of weights and measurements in the U.S." Bill HR 69, Elementary and Secondary Education Acts Amendment, passed the House on July 31, 1974 and became Public Law 93-380 on August 21, 1974. Section 403 of this law allows for financial support in establishing metric education programs, beginning July 1, 1975 and ending June 30, 1978. The Congress finds that:

(A) The metric system of measurement is in general use in industrially developed nations and its use is increasing;

(B) increased use of such metric system in the United States is inevitable, and such a metric system will become the dominant system of weights and measures in the United States; and

(C) there is no existing Federal program designed to teach children to use such metric system and such a program is necessary if the American people are to adapt to the use of the metric system of weights and measures (Metric News, Nov./Dec. 1974, p. 6).

The U.S. Office of Education has awarded two contracts for metric education projects. In 1972 a three-year grant made possible the establishment of the Center for Metric Education at Western Michigan University at Kalamazoo. This pilot project has focused on development of instructional materials for vocational and technical education, including drafting, machine shop, metalworking, building construction, and graphic arts. During the second and third years of the project, the Center conducted regional seminars for colleges and universities that have industrial teacher education programs. Other work of the Center has been the building of a metric library (Metric Assn. Newsletter, Aug. 1972, p. 2; Metric News, Nov./Dec. 1973, p. 18; and Parker, 1973, p. 16).

The second contract has been awarded to the Center of Vocational Education at Ohio State University for a three-year project (July 1974-June 1977) concerning the development and utilization of metric education instructional materials in vocational, technical, and adult education. The focus of this project will be on preparation of an annotated bibliography of metric education materials, writing a position paper on metric problems and issues, developing and testing metric instructional packages, conducting regional training workshops, and developing procedures for implementation of metric education programs in local vocational and adult education programs (Metric Assn. Newsletter, Aug. 1974, p. 2; and Metric News, Sept./Oct.1974, p.8).

State Legislation

In a number of states, metric legislation is being introduced or has been passed. California is regarded as being ahead of most other states. By the fall of 1976, all new mathematics and science textbooks will have all measurement instruction in metric units.

Dr. Wilson Riles (1973, p. 36), California's Superintendent of Public Instruction, believes that the schools must lead--not lag--in the movement toward metrication. He states:

> Whether anybody likes it or not, metrication is inevitable in the United States....
>
> The school children will reap benefits from the use of the metric system. It is more efficient as a system of measurements and is easier to learn.

In Hawaii, the State Department of Education, in cooperation with the University of Hawaii, sponsored the development of teaching materials for grades Kindergarten through six (K-6). The first trial use of the K-3 materials began in February 1974, with a pilot test scheduled for fall 1974. Based on the results of these tests, an implementation plan will be developed. In fall 1974, Maryland schools began a six-year program to convert to the metric system (Chalupsky, Crawford, Carr, 1974).

Other states that are either introducing metric education in school systems or have metric bills introduced in their legislatures include: Alabama, Florida, Georgia, Maine, Massachusetts, Michigan, Minnesota, New Jersey, New Mexico, South Carolina, and Wisconsin.

Consumer Education

Although it is apparent that the present emphasis is on teaching the metric system to children and adults who have on-the-job use for the metric

system, there is also concern for the general public (consumers). One of the recommendations of the Metric Study Report (1971, p. iii) was:

> - That early priority be given to educating every American schoolchild and the public at large to think in metric terms....

Riles (1973, p. 37) commented:

> We don't need to worry about the ability of children to learn metrics with ease. It's those of us who are older--parents, citizens--who will face a tougher adjustment. Our adult education system and the communications media will have to be involved in the effort to help the public learn to think metric. Educational systems must develop plans for such training through existing staff and resources. We should also pursue training through vocational education and home economics classes.

Chalupsky, Crawford, and Carr (1974, p. 7) state:

> Undoubtedly, one of the areas of activity that will be most affected by metrication is that of education. While formal classroom education comes first to mind, the massive problem of educating (and motivating) the adult, non-school population cannot be overlooked.

In 1970 the Survey Research Center conducted a survey of consumer knowledge about and attitudes toward the metric system, as part of the U.S. Metric Study's Report on the Consumer.

> An important finding, and one which should be encouraging to proponents of metrication, was the high correlation of a respondent's knowledge about metric measurement and his receptivity to the use of the metric system in the United States. More than 50 percent of persons able to answer correctly all the questions which were used to measure the level of information, strongly favored adoption of the metric system. Even among persons with the same amount of education, there was a strong correlation between level of information and the index of willingness to change. This supports the hypothesis that an educational program would be effective in overcoming resistance to conversion and in winning support for change (Rothrock, 1971, pp. 14-17).

Cortright (1971, p. 190) poses the question, "What, therefore, should be the role of adult education in conversion to the metric system?" He goes on to say:

> In its paper on The Educational Implication of Metrication, the National Education Association states in part that "the kind and amount of education which will be needed for the effective

> use of the metric system by adults familiar only with the current system" is an important consideration in the conversion to the metric system. Moreover, "adult education classes will help bring the present generation up to date in their knowledge of the metric system"....
>
> ...Adult education in the United States is an umbrella-term for voluntary, usually part-time programs, the "fourth force" in education, that level of non-academic, often informal education beyond elementary, secondary, and university education. We believe that the "fourth force" will become a major vehicle for interpreting and teaching the metric system to adult Americans.
>
> Adult education should be included in the long-range plan for the conversion to metrication, and the adult education associations and adult education teachers be involved in (1) creating specific curricula and procedures to this end; (2) training teachers, and (3) developing suitable instructional materials.

As stated in New York State Cooperative Extension's statement of future program direction, Perspectives for the '70's--Program Scope and Priorities (1971, p. 9), "Cooperative Extension has a responsibility for continued leadership in informal educational programs," one major program area being "consumer well-being." Although the metric system is not specifically stated as a consumer concern, legislation and policies affecting consumers, complexities of the marketplace, and coping with everyday living are mentioned (pp. 14-16, 32-34).

In 1969, a set of slides tracing the history of systems of weights and measures (including the metric system) was a Cooperative Extension program offering to the counties. (See Chapter V for more details.) No in-service education was offered to the Extension home economists. This was during the time that the three-year feasibility study was being conducted by the National Bureau of Standards and the purpose of the slide set was to create awareness of the metric system and the situation at that time.

However, much has happened on the metric front since then and Extension home economists need correct and up-to-date materials and teaching techniques

metric system, to deal with consumer concerns. Therefore, the Depart-
Design and Environmental Analysis in the New York State College of
cology has endorsed the author's metric education project as part of
partment's on-going Cooperative Extension program.

CHAPTER III

REVIEW OF LITERATURE

Adoption of the metric system by consumers is a type of change affecting everyday life and it seems to be a part of human nature to resist change. For determining the most successful strategies to incorporate into an educational program to assist consumers in adopting the metric system, it seemed appropriate to review four related areas of literature: 1) experiences in other countries now going metric; 2) recent changes of a comparable nature--Great Britain's conversion to decimal currency and Sweden's switch from left-to-right-hand driving; 3) adoption of a new idea and the role of the change agent in the adoption process; and 4) characteristics of adult learners and factors to consider in designing continuing education programs for adults.

Experiences in Other Countries

Countries Currently Experiencing Metric Conversion

At the present time among the world's nations in the various stages of undergoing metric conversion are: United Kingdom, Australia, South Africa, New Zealand, and Canada. A study of the analysis of experiences in these countries and implications for U.S. educational planning has recently been published (Chalupsky, Crawford, Carr, 1974).

Apparently, there has been very little in the way of educational research conducted in the U.S. on the best ways of teaching and learning the metric system. According to Chalupsky, Crawford, and Carr (pp. 9-10):

> From the standpoint of both efficiency and economy, the planning of such research should capitalize freely on the experiences and research findings that may already exist in the countries currently undergoing metric conversion. We are presented with what is essentially five nationwide experiments. Each is a replication of the same general treatment, but with notable differences in method and schedule. We are particularly fortunate in that all experiments occur in English-speaking countries. An enormous investment of time and resources is being made by others to implement this great change. For a modest investment we may utilize the experiences in a most profitable way as an adjunct laboratory.

The author has chosen to highlight the experiences of metric conversion in Great Britain and Australia for three reasons: 1) she has visited both countries during their conversion periods (Great Britain in 1970 and Australia in 1972); 2) she has corresponded with the metric conversion boards in both countries and has received their consumer publications; and 3) these two countries offer a striking contrast in their approach to metrication, from which much can be learned.

United Kingdom. Britain's conversion to the metric system dates back to the Hodgson Committee report of December 1950. This committee had been established by the President of the Board of Trade to study the subject of weights and measures. In their report, the committee unanimously recommended that Britain convert to the metric system; the change should be orderly and take place within a specified time period; it should be done simultaneously with other countries operating on the yard and pound system; and the currency should be decimalized prior to conversion.

British industry was opposed to the conversion at that time. In 1960, another committee was appointed to "consider whether or not it was desirable to adopt a decimal system of coinage and a metric system of weights and measures." The report showed that:

> ...a majority of industry was still opposed to a change to metric units, although the committee recognized that the world trend was towards the metric system and recommended that the situation should be reviewed every two years (Chalupsky, Crawford, Carr, 1974, p. 23).

By 1963, opinion had reversed and in 1965 the President of the Federation of British Industries informed the government that a majority of its members was in favor of conversion to the metric system. By this time most of the Commonwealth nations and former British colonies had made the decision to adopt the metric system.

The government considered industry's decision desirable and in 1966 the Standing Committee on Metrication was established by the Minister of Technology. In 1969 a Metrication Board was created to facilitate the conversion process. Eight committees were set up to represent the most important sectors of the economy. The original committee on Distribution, Food, and Consumer Goods Industries has since been divided into two committees, and in 1972 a Consumer Safeguards Group was added. The Metrication Board serves in an advisory capacity.

In 1965 the Metrication Decade was launched. The overall target date for Britain to become a metric country was by the end of 1975, but this was a "soft target." There would be no compensation for conversion. Early emphasis was to be on industry and commerce, and to some extent, on education.

The primary schools were instructed to begin at once to teach children to think in metric, but no firm schedule was established for conversion. Instruction in imperial measures was also to be continued temporarily as a second language. It appears that conversion in most primary schools was completed by 1972. No firm timetables were given to secondary education, examining bodies for education, or adult and vocational education.

During 1970, many previously-proposed programs were implemented. The public was paying more attention to metrication because of increased interest by the press, decimalization of the currency, and debates in Parliament. It should be mentioned that Parliament had passed no metric legislation and

tended to remain aloof. A long overdue White Paper on metrication in 1972 finally stated that "the government believe that the time has now come when they must act to ensure the orderly completion of the process" (Chalupsky, Crawford, Carr, 1974, p. 32).

The laissez-faire approach led to unevenness in progress toward conversion, and a loss of momentum occurred in 1971-72. Because the progress toward adoption of the metric system in the schools was far ahead of other sectors of the country, the lack of commitment especially by the public and retail trade was felt by the students. There were no practical applications in daily life to reinforce the in-school instruction.

Britain's decision in 1973 to join the European Economic Community gave stimulus to conversion. All member states are required to use the International System of Units.

The consumer has been sadly neglected and there is general apprehension and public resistance. According to an article in the Syracuse (NY) Herald-American (May 26, 1974, p. 4):

> British housewives don't like their meat and vegetables being weighed out in those foreign kilograms instead of good old pounds and ounces.
>
> Therefore, British butchers and grocers are refusing to go over to the metric system. And this, says the government's Metrication Board in its annual report, is one reason why Britain's changeover to the metric system is running two years behind schedule.

While the Metrication Board had prepared news releases, pamphlets, quarterly bulletins, touring exhibits and films, and held national conferences, the emphasis through 1971 was on industrial conversion. The Board was criticized for not disseminating information to the general public. In 1972, in addition to the quarterly bulletin, "Metric Memos"; consumer leaflets; and a 92-page paperback, Advantages of the Metric System, were produced. A film

designed for the public, "Simply Metric," was produced in 1973 and shown throughout the country. A newspaper advertising campaign was begun in 1972, but was addressed to business managers.

Consumer education was finally declared a priority for 1974, nine years after the initiation of conversion to metric! Plans include: advertising, films and displays available on loan, bookmarks, posters, and leaflets. A set of attractive consumer leaflets was recently published by the Metrication Board. The Board hopes to conduct a series of meetings with senior journalists, especially from women's magazines. An interesting note is that the Consumers Association does not appear as yet to deal with metric conversion in its consumer education program.

Even though some sectors will probably achieve metrication by 1975 (the original overall target date), the Metrication Board now hopes that Britain will become completely metric by 1979.

Australia. In 1967 the Senate Select Committee on the Metric System of Weights and Measures was appointed by the Australian government to make an extensive study of the practicability and desirability of adopting the metric system. Overwhelming support for the change was expressed by educators, industrial representatives, retailers, consumer organizations, professional organizations, and government.

Australia's currency was decimalized in 1966. This recent experience should be beneficial as Australians convert to metric, not only because it is of a comparable nature, but also because Australians are already accustomed to a system based on 10. Contrast this with the British approach of decimalizing their currency in the midst of going metric, even though the 1950 Hodgson Committee Report had recommended that the currency be decimalized prior to metric conversion.

The Metric Conversion Act of 1970 came into being and a Metric Conversion Board was appointed. The overall function of the Board is to help plan, guide, and facilitate Australia's conversion to the metric system. Specifically, the main responsibility of the Board is to help ensure the success of conversion and to coordinate various conversion programs. The Board is responsible to the Minister for Education and Science.

The government announced that the change to metric would be predominately voluntary, and costs would lie where they fall. A schedule for conversion was established and is periodically updated. Each sector of industry develops its own appropriate program, taking into consideration related activities in other sectors. The period of major implementation is 1973-75, with 70 percent completion by 1976, and 1980 as overall target date.

Metric conversion in general and education in particular appear to be on schedule or slightly ahead of schedule. A number of schools began teaching in metric units during 1972. In 1973 it was reported that metric conversion in the area of education had gone very well, and some children were using metric concepts in everyday speech. It was expected that conversion in the secondary schools would be completed by the beginning of 1974, with no major problems.

In 1972, metric conversion courses were offered to adults, but there was lack of interest. The reason was assumed to be the fact that metric conversion had not yet begun to affect the general public (and wouldn't until late 1972 or early 1973). In other words, there was no "felt" need at that time for learning the metric system. However, many adult educators had introduced metric measurements in existing courses on other subjects.

In their study, Chalupsky, Crawford, and Carr (p. 44) point out that:

> Australia's Metric Conversion Board, very likely benefitting from the U.K. experience, recognized that establishing and maintaining a high level of communication with the general public was a crucial element in successful implementation of metric conversion. The plan was first to create an awareness of the imminence of conversion and to develop a climate favorable to the change through an understanding of why Australia was metricating and what it would involve. A prime goal was to overcome any apprehension regarding the change. Following this, the need was recognized for information appropriate to particular conversions as they arise, such as the conversion to Celsius temperature.

The Metric Conversion Board stimulated an awareness for metrication with its initial publication, "Metric Conversion for Australia," which appeared in June 1971. The Board then initiated a publication program of leaflets, pamphlets, monthly newsletters, and posters to increase public awareness and to provide specific information. Senior representatives of mass media and advertising agencies serve on the Board's Public Relations Advisory Committee. Most of the leading newspapers assured their support for metric conversion, and nearly every media organization named a staff member to be responsible for reporting on metrication and to serve as a liaison with the Board's Director of Public Relations.

In 1972-73, there was a shift in emphasis from public awareness to public involvement. Horse racing (August 1, 1972) and weather reporting (September 1, 1972) were deliberately chosen for conversion because everyone would be involved to some extent (highly-visible common frames of reference), and their impact would not be so intense as to create much public resistance. Also, these two conversions demonstrated that, "taken step-by-step, the public would be able to cope with metric conversion just as competently as it did with currency conversion" (Chalupsky, Crawford, Carr, 1974, p. 45).

An intensive education, publicity, and public relations campaign was conducted prior to the conversion, with a minimum period of dual units. The

Board's feeling was that learning to "think metric" is hindered rather than helped by the use of both metric and imperial units in conversion tables.

In the brochure published on the weather, little space was devoted to why there was a need to convert temperature readings to metric. Instead, there was a simple statement that "Australia is becoming a metric nation and that as of the first of September temperatures will be measured in degrees Celsius, replacing degrees Fahrenheit" (Chalupsky, Crawford, Carr, 1974, p. 46).

The U.S. is capitalizing on Australia's successful experience in converting weather reporting to metric. According to Metric Association Newsletter (Aug. 1974, p. 3):

> In general, the NWS will follow the Australian approach to conversion to metric units, as contrasted to the British approach. The Australian approach may be thought of as a "quick plunge" to get it over with as quickly as possible--after a prolonged public education program, and after a nationwide publicity campaign makes clear to everyone that beyond a given date a certain weather measurement--say temperature--will be given only in metric units. This cutoff provides the needed incentive for people to learn the metric system.

In Australia, resistance to metric conversion has been minimal. When resistance was shown in adult education courses, the standard approach was to show how easy the metric system is.

One of the problem areas is size/price changes of consumer goods--some consumers think that the prices have been unjustifiably increased with conversion to metric. In correspondence with Sheila Mason, Women's Adviser of the Metric Conversion Board (September 20, 1974), regarding the public campaign to educate consumers about size changes and how to relate these to the old prices, she replied that it:

> ...is being done on a zonal basis, as and when a particular area is covered by the retail scale converters and the Weights and Measures authorities. As their scales are converted, all retailers

receive bright cheerful posters designed to familiarise customers with useful sizes for different commodities (i.e. 250 g mushrooms, 2 kg potatoes). At the same time a portable display is erected in a local shopping centre of the area and as Women's Adviser I try to spend several days (particularly Thursday, Friday and Saturday, the busiest shopping days) talking to shoppers and answering questions. Radio and television interviews are also sought and obtained at stations covering the converting area. Speakers from the Metric Conversion Board are offered to service clubs and ladies' groups in the area to co-incide.

To commemorate Australia's conversion to the metric system, in 1973 the Post Office issued four seven-cent (for letters within the country) cartoon-style stamps. The purpose of the stamps was to create public awareness and to call attention to the four most-frequently-used units--length, volume, mass, and temperature. However, there was a difference of opinion as to whether they were "nauseating works of non-art" (Sydney Sun) or "something to brighten up those dull old pages of first-day covers" (Brisbane Sunday Sun).

Concluding comments. A Commonwealth Conference on Metrication was held in London in April 1973. Among the major conclusions which relate to consumer education were:

1. Consumer confidence is immensely important. Consumers need to be reassured and have their interests protected. The packing and marking of consumer goods is highly important.

2. An effective information policy is indispensable; it needs to be carefully directed to the right audience at the right time through the right media. Awareness in advance, and knowledge and understanding through involvement are crucial.

3. Important roles in the dissemination function are to be played by all government departments, industry, and particularly teachers who have an indispensable role.

4. The effectiveness of the information program depends in part on the development of timetables for the sectors of interest and by evidence that the change is really happening and that the government is supporting the change (Chalupsky, Crawford, Carr, 1974, pp. 114-115).

To conclude their study, Chalupsky, Crawford, and Carr (p. 123) state:

> The fact that a country can profit significantly from another country's experience is amply demonstrated by the success that Australia's metric conversion program has demonstrated. Without in any way detracting from the creativity and problem solving ability of the Australians, it is a testament to their acumen that they were willing to observe the British experience and take steps to avoid reinventing the wheel of misfortune as they designed their own program. The fact that the U.S. lags behind every other major country in conversion to the metric system presents us with a truly unique opportunity to learn from these other countries.

Great Britain's Conversion to Decimal Currency

Just as the U.S. is one of the last countries in the world to adopt the metric system, Great Britain was one of the last to adopt decimal currency, even though interest in decimal currency went back to at least 1824 (Change for a Pound, 1968).

In 1967, the Decimal Currency Act was passed and the decimal system became official on February 15, 1971, Decimal Day (D-Day). The pound, with its existing name and value, remained the major unit of currency, but it was divided into 100 new pence, instead of 20 shillings. The following new coins were introduced: 50 new pence (a new coin worth 10 shillings); 10 new pence (different only in design from the two shilling); five new pence (differing only in design from the one shilling); two new pence; one new penny; and half new penny.

Since they differed only in design from shillings and florins, the five and 10 new pence pieces were introduced during 1968 to maintain supplies of shillings and florins. The 50 new pence piece replaced the 10 shilling note in October 1969. Of the pound/shilling/pence coins, the halfpenny and the halfcrown were phased out by D-Day. (When the author was in Great Britain

in May, 1970, she was aware that the halfcrown was no longer in circulation). Shillings and old pence remained legal tender for 18 months. The one-pound, five-pound, and 10-pound banknotes remained unchanged.

Even though decimal currency became official on D-Day, it was followed by a changeover period, during which time both old and new currencies circulated together and cash registers, accounting machines, and slot machines were converted to decimal working. During the changeover period, goods were labeled in both money systems. Nine months prior to D-Day, the author noticed books and restaurant menus with dual prices.

A Decimal Currency Board was established to make recommendations to the Government and to conduct a publicity campaign for the public. The children were taught the new decimal system of currency at school and in-service courses were held for teachers.

A three-million-dollar campaign to make D-Day easier was begun seven weeks prior to the changeover (Poughkeepsie (NY) Journal, Jan. 1, 1971, p. 12). Advertisements coaxing the British to "meet our new money" appeared in all major newspapers, along with pictures of the new coins. A series of nine newspaper advertisements explained how to speak in new pence (e.g., one pound 50 new pence instead of one pound 10 shillings) and how to write amounts in pounds and new pence instead of pounds, shillings, and pence.

Prime-time television commercials, magazine advertisements, posters, and free booklets to 20 million homes were also a part of the "think decimal" drive.

Banks were closed February 11-14 to get ready, British railroads changed over on February 14 for practice, but the bus companies held off until February 21 so that their passengers and ticket clerks could become accustomed to the new money.

Sweden's Switch from Left-to-Right-Hand Driving

On September 3, 1967 Swedish motorists switched from left-to-right-hand driving (Roalman, 1968). Despite many logical reasons for the change, there had been "hostile public opinion" against it.

A well-organized public information campaign was conducted for three years prior to the changeover to inform the public fully, and to enlist more enthusiasm for the switchover than existed when the Swedish Parliament passed the legislation in 1963. The plan was to reach each person at least once through official channels, practically everyone several times through official communications, and most people repeatedly through official and unofficial (interpersonal) means.

All communication efforts up to two weeks prior to the changeover were somewhat low in intensity. Throughout 1966 there were radio and television programs and spot announcements, plus newspaper and magazine advertisements. During the summer of 1967, an eight-part television series ran simultaneously with daily press advertisements, slide presentations were made available for organizations to use, materials were prepared for school instruction, posters were placed in stores, and letters were sent to transportation companies in other countries and to everyone in Sweden. In the early stages a field organization was established, consisting of a representative from each of the 24 counties to plan local activities, plus a traffic adviser in each county and a liaison teacher in each school district in charge of traffic instruction in the schools.

During the last two weeks prior to the switchover, the campaign went into high gear. Schools opened a week early to impress the students with the fact that the change was to take place, and to give them information necessary for their safety. This made a national impression and created a

lot of conversation. The day of the switchover and the day after were school holidays. The students worked closely with police and military personnel by standing at practically all intersections in Sweden to help guide pedestrians.

Various industries cooperated in promoting the switchover. The Swedish Dairy Association produced milk cartons with information about the change; a cookie company designed a special package; men's ties sported the new highway symbol (an "H" leaning to the right, standing for "hoger," the Swedish word for right); and a child's game manufacturer, glove company, and soda pop manufacturer all produced products.

Television, radio, newspaper advertisements, posters, filmstrips, brochures, and publicity releases were used on a mass scale. Pedestrians were urged to carry and use reflective dangle tags at night to attract the attention of motorists.

A giant reinforcement program was undertaken on the day of the switchover, September 3, 1967, and ran until the end of December 1967. On September 3, posters were placed along the roadside; this was the first time roadside posters had been used, as they had been saved until the end to make a new and forceful impression. The new "H" traffic sign was put up all over Sweden, in addition to other new traffic signs. In every movie theater, four 15-second films were shown twice a day, auto clubs continued to conduct special classes for right-hand driving, and 12 million small stickers with the "H" symbol were distributed (the population of Sweden at that time was eight million).

After an all-night television show on September 2, people went out and practiced driving according to the new system, with no fatalities reported on September 3 or 4.

Adoption of a New Idea

ccording to Rogers and Shoemaker (1971, pp. 18-19):

> Crucial elements in the diffusion of new ideas are: (1) the innovation, (2) which is communicated through certain channels, (3) over time, (4) among the members of a social system.
>
> An innovation is an idea, practice, or object perceived as new by an individual....
>
> "New" in an innovative idea need not be simply new knowledge. An innovation might be known by an individual for some time (that is, he is aware of the idea), but he has not yet developed a favorable or unfavorable attitude toward it, nor has he adopted or rejected it. The "newness" aspect of an innovation may be expressed in knowledge, in attitude, or regarding a decision to use it.

o matter how old an idea is, it is considered to be an innovation
irst affects an individual. Currently, the metric system is con-
new idea by many consumers in the U.S.

hange agents are professionals who are charged with the responsi-
f communicating new ideas to the ultimate users and securing their
e. A change agent (Extension home economist) provides the link be-
change agency (Cooperative Extension) and a client system (resi-
a given county).

and Rogers (1957, p. 630) state:

> The problem of how to diffuse these ideas and practices, especially to adult publics, has long been the special concern of such "change agents" as the home economics teachers, the extension home economists, and those in consumer education.

of their study on informational sources in the adoption process
brics was to acquaint home economics research workers with the con-
the adoption process and give change agents some insights into the
y of that process and the roles different communication channels
ay.

The Adoption Process

The five-stage adoption process model was developed by rural sociologists in 1955. Although it has been highly favored in the past, recent critics point out that it is too simple. Also, the model has several deficiencies, among them being that: it is implied that the process always ends in adoption, whereas rejection may also be an outcome; the five stages do not always occur in the specified order, and some may be skipped, particularly the trial stage; and evaluation actually occurs throughout the process, rather than during just one stage. Researchers do agree, however, that an individual's decision to adopt is not random behavior, but a process consisting of a series of distinguishable stages occurring over a period of time. A four-stage (knowledge, persuasion, decision, confirmation) innovation-decision process has been recently developed to counteract the deficiencies in the earlier adoption process model (Rogers and Shoemaker, 1971, pp. 100-101).

In spite of its drawbacks, the earlier model will be explained and applied to adoption of the metric system because the research the author wishes to cite has used the adoption process rather than the innovation-decision process. Following are the definitions of each of the five stages (Rogers and Shoemaker, 1971, pp. 100-101) with application to the metric system by Warning (1972, pp. 18-19):

1. Awareness stage

   The individual learns of the existence of the new idea, but lacks information about it.

   The first stage in learning to "think metric" [adoption] begins when a person hears that we are probably going to change over to the metric system in the United States in the near future.

2. Interest stage (also called information stage)

   The individual develops interest in the innovation and seeks additional information about it.

   At this point the aware person begins to question: what are the metric units, disadvantages, advantages, similarities to and differences from present system? At this stage, too, he acquires small, relatively inexpensive tools and measuring devices such as tape measures, rulers, thermometer, and probably some handy conversion tables.

3. Evaluation stage (also called application stage)

   The individual makes mental application of the new idea to his present and anticipated future situation and decides whether or not to try it. He measures his height, weight, and girth in metric dimensions and units; consults the thermometer, calculates the speed at which he is driving. Gradually, his practices leads him to the next stage.

4. Trial stage

   The individual actually applies the new idea on a small scale in order to determine its utility in his own situation.

   During this period he uses the metric system more and more frequently. If he finds trial runs successful and pleasant, he almost forgets the old system.

5. Adoption stage

   The individual uses the new idea continuously on a full scale.

   The learner has begun to think in metric terms. Furthermore, he has become an enthusiast. He is convinced of the superiority of the new system, argues in its favor, and enjoys demonstrating its advantages.

Change takes time. The period from first awareness-knowledge of an innovation to the decision by an individual to adopt (or reject) can be measured in days, months, or years. Rogers and Shoemaker (p. 16) point out that more than 14 years were required for hybrid seed corn to reach complete adoption in Iowa; U.S. public schools required 50 years to adopt the idea of the kindergarten; whereas, it took about five or six years to adopt modern math. Regarding the metric system, Donovan (1970, pp. 196-197) says:

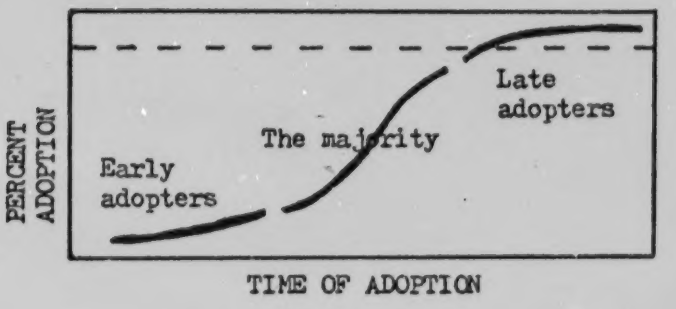
> ...it is safe to say that the United States will not be fully converted to the system until two generations of children, yet unborn, have reached adulthood. The first generation, which will enter school starting in the late 1970's, will probably learn both systems, perhaps at about an equal level. They will be bilingual in terms of measurements. When they leave school they will use the metric system at work but may use the inch-pound system for some purposes in the home. The second generation will learn only the metric system in school and will undoubtedly consider any use of the archaic Customary units by their parents as an indication that the older generation is not "with it."

Innovations that have certain characteristics are usually adopted more quickly. For example, innovations that are relatively simple in nature; divisible for trial (i.e., may be experimented with on a limited basis), and compatible with existing values, previous experience, and needs of receivers usually have a shorter period than innovations without these characteristics. The relative advantage of a new idea--the degree to which it is perceived as being better than the idea it supercedes--also has an effect on rate of adoption. Observability--the degree to which the results of an innovation are visible to others--is positively related to its rate of adoption. The purpose of demonstrations by change agents is to increase the observability of an innovation (Rogers and Shoemaker, 1971, pp. 138-156).

Adopters and Their Characteristics

Not everyone adopts a new idea at the same time. Some people adopt first, some adopt later, and others adopt last. Initially, the rate of adoption is slow and gradual, "with a much more rapid rate of acceptance later on." For some innovations, there are people who never adopt (Lionberger, 1960, p. 4).

Lionberger (p. 34) presents this concept graphically:



According to Lionberger (pp. 36-37):

> The fact that people adopt new ideas or practices at different times means that they can be classified in terms of their time position in the adoption pattern. The classification may be as simple as an early-late adoption division, which means that early adopters accept a given change sooner than the majority, and that the late ones accept it later than most others.

Early adopters. Lionberger (pp. 38-41) found that early adopters ordinarily have larger farms and decidedly higher incomes than the average in the areas where they live. They are willing to take risks. They are likely to be middle-aged or less. Early adopters seem to be among the first to try new ideas. They participate in formal organizations that bring them in frequent contact with other people in the community and beyond. Early adopters actively seek new ideas and are quick to try them. For example, they may go directly to experiment station personnel to learn about the latest research being done.

The majority. The majority have about average-sized farms and income in the areas where they live, although there is likely to be considerable variation. They participate in some local formal groups, such as church and PTA. The great majority are generally receptive to new ideas, but don't actively seek them.

Late adopters. Late adopters usually have smaller farms and subsistence operations. They tend to be elderly and security is important to them. Often more vulnerable to risk, they are inclined to stick to the safer tried and tested practices. Late adopters participate very little in formal groups, except the church. Most social activities are confined to meetings with friends and relatives.

Can characteristics of farmers be applied to homemakers? In her study of adoption of sewing techniques published in a series of 13 Extension leaflets, Schock (1972) found that her research supports conclusions of earlier studies.

Her results (Schock, 1972, ch. 8) indicate that early adopters had more children at home, were younger, had more sewing experience, had higher income, and had higher scores on opinion leadership scale (source of advice, giving information to friends). Early adopters were more likely to be college graduates, and were more likely to belong to organizations locally and outside the community. On the other hand, late adopters were more likely to maintain no group memberships. Early adopters had higher mean scores on idea seeking and risk taking. They were more likely to tell more people and people who lived farther away about the leaflets. They most often told friends, neighbors, and relatives. Early adopters were more likely to pass on information after one month. After six months, early and majority adopters were about equal in passing on information.

Rogers and Shoemaker (pp. 183-188) have classified adopters as innovators, early adopters, early majority, late majority, and laggards. They point out some interesting personality variables associated with innovativeness, which shed more light on why some people adopt a new idea earlier than others. For example, earlier adopters have a greater ability to deal with

abstractions than later adopters; earlier adopters must be able to conceptualize the information and apply it to their own situations. On the other hand, later adopters can observe the results of innovations by earlier adopters and need less ability to deal with abstractions. Earlier adopters have greater intelligence than later adopters. Earlier adopters have more favorable attitudes toward change, risk, education, and science than later adopters. Earlier adopters are more in control of their lives, whereas later adopters believe that their future is determined by fate. Earlier adopters have higher levels of achievement motivation (desire for excellence in order for an individual to attain a sense of personal accomplishment), and higher aspirations (for education, occupations, etc.) than later adopters.

Communication Channels

Communication channels are categorized as either mass media or interpersonal in nature. Each has distinguishing characteristics which make one more appropriate than the other for certain tasks. Mass media and interpersonal sources play complementary rather than competing roles in transmitting messages.

Rogers and Shoemaker (pp. 252-253) define mass media channels as:

> ...all those means of transmitting messages that involve a mass medium, such as radio, television, film, newspapers, magazines, and the like, which enable a source of one or a few individuals to reach an audience of many.... Mass media can:
>
> 1. Reach a large audience rapidly.
> 2. Create knowledge and spread information.
> 3. Lead to changes in weakly held attitudes.
>
> However, the formation and change of strongly held attitudes is best accomplished by interpersonal channels.
>
> Interpersonal channels are those that involve a face-to-face exchange between two or more individuals. These channels have

greater effectiveness in the face of resistance or apathy on the part of the communicatee. What can interpersonal channels do?

1. Allow a two-way exchange of ideas. The receiver may secure clarification or additional information about the innovation from the source individual....
2. Persuade receiving individuals to form or change strongly held attitudes.

Mass media channels are relatively more important during the awareness-interest stages of adoption, whereas interpersonal channels are relatively more important at the evaluation-trial stages. Rogers and Shoemaker (p. 256) point out that to maximize the probability of adoption, "communication channels must be utilized in an ideal time sequence, progressing from mass media to interpersonal channels." If inappropriate channels are used in the awareness-interest stages, the spread of knowledge and information will be slowed down and adoption will be delayed.

Mass media messages can help to create a favorable attitude toward a new idea, but they "are too general to provide the specific reinforcement that the individual needs to confirm his beliefs about the innovation" (Rogers and Shoemaker, 1971, p. 109).

In their study of adoption of new fabrics (nylon, Orlon, and Dacron), Beal and Rogers (1957) categorized the homemakers' sources of information as:

1. Mass media--radio, television, magazines, newspapers
2. Agencies--high school home economics teachers and county Extension home economists
3. Informal contacts--relatives, neighbors, friends
4. Commercial--door-to-door saleswomen, store salespeople, direct-mail sales, store displays, written material with the garments
5. Self--own information, experimentation, and interpretation

Beal and Rogers (1957) found that mass media were most important in the awareness stage, then decreased in importance. Informal contacts were most important in the information and application stages. Commercial sources

were increasingly important from awareness through trial. Agencies were mentioned by relatively few homemakers, but were most important at the information stage. Self was increasingly more important from application through trial to adoption. All of the homemakers stated that their own personal satisfaction with the trial led them to adopt the fabrics, keep the garments they purchased, and plan to buy additional garments.

In this study, mass media channels seemed to be very effective in informing homemakers that an innovation existed, but were less effective in convincing them to try it out. Homemakers seemed to discuss the product with their friends and relatives before actually trying it. Commercial sources seemed to be most important at the trial stage when the homemaker wanted "how-to" information.

The author summarized the data from Table 1 (p. 633) of Beal and Rogers' study and arranged it according to rank order of information sources by stages in the adoption process:

Stages in the adoption process			
Awareness	Interest (Information)	Evaluation (Application)	Trial
1. Mass media (59%)	1. Mass media (34%)	1. Informal (39%)	1. Commercial (40%)
2. Informal (16%)	2. Informal (34%)	2. Commercial (31%)	2. Informal (18%)
3. Commercial (15%)	3. Commercial (16%)	3. Mass media (12%)	3. Self (16%)
4. Don't know* (6%)	4. Agencies (6%)	4. Self (6%)	4. Don't know* (12%)
5. Agencies (4%)	5. Not aware** (6%)	5. Don't know* (5%)	5. Mass media (9%)
	6. Don't know* (4%)	6. Not aware** (4%)	6. Agencies (4%)
		7. Agencies (3%)	7. Not aware** (1%)

*Don't know = don't know or no information.
**Not aware = not aware of going through this stage.

Communication channels by adopter categories. The previous discussion of communication channels by stages in the adoption process did not take into consideration channel use by earlier versus later adopters. According to Rogers and Shoemaker (p. 259), "Mass media channels are relatively more important than interpersonal channels for earlier adopters than for later adopters." At the time the earliest adopters (innovators) adopt a new idea, no one else has had experience with it. Earlier adopters have a need for venturesomeness, and the stimulus provided by the mass media message is enough to spur them on to adoption. On the other hand, later adopters require a stronger influence, such as that resulting from interpersonal sources. Also, later adopters do not need to depend so much on mass media channels because there is a "store" of interpersonal, local experience available by the time they are ready to adopt.

Role of the Change Agent

As stated earlier, the role of the change agent is to communicate new ideas in the hope that they will be adopted. Once the adoption process gets underway and generates itself (due to early adopters influencing their peers), the change agent feels that his or her job is completed.

However, Rogers and Shoemaker (p. 107) suggest that:

> Change agents could perhaps play their most distinctive and important role in the innovation-decision process if they concentrated on "how-to" knowledge which is probably most essential to clients at the trial and decision function in the process. (One possible reason for the underemphasis by change agents upon creating how-to knowledge is that change agency policies usually provide greater rewards to change agents for creating awareness-knowledge, perhaps because it is often easier to measure.)

"How-to" knowledge is especially important for adoption of the metric system.

Rogers and Shoemaker (p. 115) also propose a new role for the change agent--providing supporting messages to individuals who have previously adopted:

> Possibly one of the reasons for the relatively high rate of discontinuance of some innovations is that change agents assume that once adoption is secured, it will continue.

Regarding adoption of the metric system, Parker (1973, p. 15) states that "home economists, as agents of change, must launch extensive and intensive programs on metrication," and Warning (1972, p. 19) comments:

> If the United States adopts the metric system as official and the homemaker suddenly finds herself obliged to buy fabrics by the meter, milk by the liter, and apples by the kilogram, more than likely she will expect help from home economists.

Batcher and Young (1974, p. 29) further emphasize:

> The consumer will be the last to feel the change to the metric system, but home economists will need to be ready to help consumers make that change easily.

Purchase (1974, p. 6) feels that, "For everyone in teaching, new challenges await." Home economists with New York State Cooperative Extension are among those to be challenged, as homemakers, teachers, and others turn to them for assistance.

Designing Continuing Education Programs

Characteristics of Adult Learners

In planning and implementing a metric education program for consumers, it is necessary to take into consideration characteristics of adult learners. Otherwise, the program has no chance of being successful.

Unlike youth in a traditional school situation, adults do not constitute a captive audience. They come to class voluntarily. Participation in adult or continuing education is secondary to earning a living, caring

for a family, running a home, etc. Adults participate largely to meet immediate "felt" needs and are primarily interested in new information and skills that are useful now, or as Knowles (1950, p. 21) says, "The best time to learn something is when you feel acutely uncomfortable about not knowing it." Adults may continue to participate or not, depending on whether the particular program meets their needs. They need to feel that their time is well spent and that the material presented is relevant and practical. Adults bring a broad background of experience to the classroom--a wide range of knowledge, experiences, skills, and attitudes. Adults in a group are usually a heterogeneous audience; i.e., they have a wide age range, different interests and needs, different learning abilities, experiences, educational background, and motivation for learning (Campbell, 1971, p. 34; and Leagans, 1972, p. 257).

In a study to determine why adults begin and continue a learning project, Tough (1968, pp. 52-53) found that:

> The single most common and most important reason for adult learning is the desire to use or apply the knowledge and skill.
>
> ...The major emphasis in adult learning is on the practical rather than the academic; on the applied rather than the theoretical; ...subject matter directly useful in the performance of everyday tasks and obligations.
>
> The second largest number of adult learning projects began as a result of puzzlement, curiosity, or a question. A high proportion of these topics were major issues or highly controversial issues, or were especially important in the life of the learner for some other reason.

Identification of Needs

According to Leagans (1966, p. 90):

> Since adults examine program offerings according to what they consider important (their "felt" needs), the central problem in successful programming is to accurately identify what people

> want, think they need, and actually do need and get these woven into a realistic, well-organized, and concerted series of forceful activities. This may properly be called a program.

Many consumers may feel that they have no "need" to learn or even learn about the metric system. In this case, the first objective in developing a program would be to create an interest in the metric system, in order to motivate adults to respond. As Leagans says (1972, p. 269):

> Since participation in continuing education is largely voluntary, effective teaching of adults requires the harmonizing of what learners feel they need and what professional educators think they ought to have.

Considerations in Planning Programs

One of the most important techniques to keep in mind when teaching adults is to keep content and approach down-to-earth and practical, rather than theoretical. This cannot be emphasized enough. Students' interests should be kept alive by making classes challenging, stimulating, and action-oriented. Content needs to relate to real-life problems, and real-life situations and experiences should be used. Students' personal experiences should be drawn upon in planning and teaching. The teacher should be organized and well-prepared, so class time is not wasted (Campbell, 1971, p. 34).

A principle of adult learning (Knowles, 1950, p. 33) is that students should participate in the learning process. The best way to learn is by doing. The more involved the students are, the more they will learn.

CHAPTER IV

THE METRIC EDUCATION PROGRAM

Description of the Situation

Over 90 percent of the world's population uses the metric system of measurement. The U.S. is the only industrialized nation not yet metric or officially committed to going metric.

The 1971 Metric Study Report recommended a change to the metric system. National legislation to initiate the change was introduced in the last two sessions of Congress, but was not passed. However, Congress did pass and the President signed into law the Elementary and Secondary Education Acts Amendment providing financial support in establishing metric education programs. In a number of states, metric legislation is being introduced or has already been passed.

Many major corporations are converting to the metric system and consumer-oriented industries are beginning to go metric. With or without a coordinated plan, the U.S. is moving toward metric.

Cooperative Extension is in a unique position to be of assistance to consumers in adopting the metric system of measurement.

Significant Needs

Since so much evidence of the metric system is beginning to appear in everyday life, consumers need to become interested in the metric system and be aware of what it is, its relative advantages, why the U.S. is going metric, and how easy the metric system is to use. At the time knowledge of the metric

d skills in using it are to be applied to a particular situation using metric recipes), consumers need to become actively involved ing the metric system and how to use it.

Objectives to be Achieved

he primary objectives of the metric education program are to help s:

Become aware of the situation regarding use of the customary and metric systems in world markets.

A. Understand why the U.S. is going metric.

B. Recognize the need for a well-planned transition from the customary to the metric system of measurement.

Understand the metric system and its advantages.

A. Recognize and identify words, prefixes, and symbols used in the measurement of length, mass (weight), volume, and temperature.

B. Recognize the simplicity of learning and using the metric system as compared to the customary system.

1. Understand the scientific base and logic of the metric system.
2. Understand the interrelationships among the various basic units.

Prepare for the metric system as use of metric measurements increases.

A. Demonstrate willingness to learn and use the metric system.

B. Apply the use of metric units to specific situations.

e means for achieving these objectives (approaches to use in teaching experiences, etc.) will be described in Chapter VI.

CHAPTER V

THE SURVEY

Prior to developing an educational program for assisting consumers with adoption of the metric system, a survey of the Extension home economists was conducted to determine their interests and needs regarding this program.

Specifically, the purposes of the survey were to: 1) learn what (if any) metric education programs and activities were undertaken in the 1973-74 program year and what has been planned for 1974-75; 2) determine agents' interests in participating in a workshop on the metric system (in-service education); 3) determine agents' familiarity with the metric system--understanding relationships between basic units in customary and metric systems of measurement, acquisition of and ability in using metric measuring devices and conversion charts; 4) discover what use has been made of a previous metric education program, "The Kilos are Coming"; 5) find out what types of information and materials would be useful in conducting county programs; and 6) gain support from the Extension home economists for the metric education program.

Whereas youth are becoming acquainted with the metric system in elementary school, adults are left, for the most part, to their own initiative to learn about the metric system. Cooperative Extension's adult program would be expected to place a high priority on implementing metric education as part of its consumer program, while the 4-H program would put a much lower priority on metric education. Thus far, the metric system is permeating the

consumer market in labeling of food products and other consumer goods, nutritional labeling information, measuring devices, sewing patterns, metric tapes, and sewing gauges of various kinds. As Extension home economists receive requests for information about the metric system from teachers, consumers, and others, they will acquire resources, including measuring devices, conversion charts, etc. and begin to use them.

Therefore, it was hypothesized that: 1) the home economists working with the adult program would show more interest and involvement in metric education than the 4-H agents; 2) those with responsibilities for consumer education, textiles and clothing, and food and nutrition subject matter would be more interested than agents responsible for other subject matter areas, or administration and program leadership; and 3) those who have acquired metric measuring devices, conversion charts, etc. would be more knowledgeable about the metric system than those who have not acquired any devices.

Methodology

In April 1974 an open-ended questionnaire (see Appendix) was sent to all county Extension home economists in New York State. The mailing list of 211 also included the Metropolitan New York City director, Albany television specialist, consumer education specialist with New York State Consumer Protection Board (joint appointment with Cooperative Extension), and Putnam County administrator (at that time there was no home economics program in that county). The mailing of the questionnaire was purposely scheduled for April after the Plan of Work for 1974-75 was completed.

There were 136 questionnaires returned (64 percent response), with 70 respondents responsible for the adult program; 37 4-H home economists; 28, both adult and 4-H; and one, no information. All 55 counties with an Extension

home economics program were represented. Three-fifths of the agents responding have been employed five years or less (Appendix, table 1).

The author assumed that there would be more subject matter specialization among agent staff in relation to county program responsibilities than there turned out to be. When the initial tally was made for the 70 adult home economists, 57 different combinations resulted. By regrouping, three meaningful categories were arrived at: 1) consumer education, mass media, alone or in combination with other program areas; all home economics program, general home economics (35 agents); 2) textiles and clothing, food and nutrition, Expanded Nutrition Education Program (ENEP), but not including consumer education or mass media; may include some administration (29); and 3) administration, family life, child development, community resource development (CRD), but not including any areas from categories 1 and 2 (4). Two agents did not give their program area. The author now recognizes that a forced-choice question may have been more appropriate for acquiring information pertaining to county program responsibilities.

The 37 4-H agents were classified into two groups: 1) program, most agents being responsible for the total 4-H home economics program (32); and 2) administration (4). One agent did not state program area. The same was true for the 28 home economists working with both the adult and youth programs; 23 being responsible for program, and four for administration. One agent did not give her area of program responsibility (Appendix, table 2).

Analysis and Interpretation of Data

Program Requests and Plans

Of the 70 adult home economists, 10 consumer education agents, 11 "other program" agents, and three administrators had had requests for

programs in the past year from school teachers (elementary and home economics), general consumers, consumer advisory group, Grange, Home Economics Program Committee, homemaker and community groups, Sealer of Weights and Measures, home economists, Welcome Wagon Club, public relations firm, newspapers, and sixth grader for science fair display. In only three instances was a program presented. Agents loaned the package program, "The Kilos are Coming," served as resource persons, distributed literature, etc. In addition, several agents have written articles for newsletters and newspaper, prepared a service letter for enrollees, and presented radio spots.

Eight consumer education agents, one "other program" agent, and none of the administrators have programs pertaining to the metric system in their 1974-75 Plan of Work. Activities and/or audiences include: consumer newsletter will incorporate information on using metric system in reading nutritional labels; adults; consumers interested in current legislative issues; television viewers, radio listeners, newspaper readers, Extension news publications; class on the metric system in the consumer market; classes for general audience; speakers' bureau; loan packet; incorporate information into other programs, such as lessons in clothing construction and consumer buying; and training for ENEP aides.

None of the 37 4-H home economists had received requests for programs on the metric system in 1973-74 and only one has plans for 1974-75--a program as a list of specials for teens and leaders, which received high priority from a number of leaders. One county planned to include an exhibit on the use of the metric system in clothing at their 1974 sewing festival (October 1974).

Of the 28 home economists responsible for both programs, three "program" agents and two administrators had requests for programs in the past

year from teachers, schools, local newspaper, homemaker group, and individual homemakers. No programs were presented, but materials were given, slide set was loaned, etc.

Seven "program" agents and none of the administrators have plans for 1974-75. These include: possibly including topic in speakers' bureau list; consumer concerns column in local media--information about the metric system will be included; a program dealing with the metric system and nutritional labeling will be presented in the spring of 1975; possible television topic; open meeting and leader training; sewing in metrics for general home economics audience and also home economics teachers; and workshop or press releases to educate the public on use of the metric system (Appendix, table 3).

"The Kilos are Coming" Slide Program

In 1969, a slide program tracing the history of all measuring systems, "The Kilos are Coming," was made available to New York State Extension home economists. It had been developed by a family economics Extension specialist at the University of Vermont. According to the results of this questionnaire, 23 of the 55 counties purchased it. This slide program was also available on loan from Cornell University. However, it is now out-of-date, and the author feels that present educational efforts need to go beyond the scope of this earlier "awareness" program.

Thirty-eight of the adult home economists are familiar with or have heard of this program, but only eight have used it themselves in teaching. For the most part, it has been available on loan, as a kit or self-study type of program. Of the 4-H home economists, nine are familiar with the program and one has used it. Of the agents who do both 4-H and adult work, eight are familiar with it and five have used it. The fact that three-fifths of

the agents responding to the questionnaire have been employed five years or less may be a factor as to why more agents are not aware of this program (Appendix, table 4).

A few agents had some specific comments to make about the "Kilos are Coming": "needs updating," "We did have leader training...several years ago; it was well received and many groups used slides and materials." "Found "Kilos" to be OK for background philosophy, but believe people will be more interested in comparisons and basic information needed to exist in a metric system," "Renamed it "Think Metric--much better."

The Metric System in Everyday Life

More than half of all the Extension home economists have acquired metric measuring devices, conversion charts, etc., which indicates that they are in the second or information-gathering stage of adoption (Appendix, table 5). Mentioned most frequently were: Foley measuring cup (a free offer was made to Extension home economists in the summer of 1973 by Foley Manufacturing Company); National Bureau of Standards wallet-size conversion card; Union Carbide metric teaching aids; Belding Corticelli metric sewing aids; Sears yardage conversion chart; New York State Department of Agriculture and Markets booklet; plus assorted tape measures, rulers, meter sticks, conversion charts and cards, magazine articles, books, temperature conversion scale, etc.

Agents who had acquired conversion charts, etc. could answer correctly all four questions dealing with practical applications of the metric system to everyday life more frequently than those who had not acquired conversion charts (Appendix, table 6). It was interesting to note some of the comments, "I know that answer is right, I used the chart!" or "Thank you for making me use this metric card!" Each of the four questions was answered correctly

about equally as often. The total numbers of correct answers were 76, 69, 80, and 69, respectively.

Overall, two-thirds of the agents were able to give two or three correct examples of the metric system in their everyday lives (Appendix, table 6). Examples given most frequently were food-related: weights on cans, nutritional labeling, Recommended Daily Allowance, and measuring cups. Other examples given included: sewing equipment and patterns; drugs and medicines; tools; foreign car parts; scientific, chemistry; and athletic events.

Information and Materials Requested by Agents

Many agents are concerned about how to teach the metric system. They have asked for easy and appealing ways to teach metric, teaching outline, teaching ideas, practical applications, everyday uses, more easy questions like on questionnaire, some ways to show that it is not really that different, group exercises and activities, how to make conversions simply and easily, how to teach other people to make conversions, how to gradually introduce people to the metric system and reassure them that the change is not impossible.

Several agents involved with mass media have asked for radio spots, news releases, and suggestions for television programs. Printed material is also needed, especially simple handouts that can be used in teaching and then kept by the consumer--conversion charts, fact sheet, general information bulletin, handouts geared to specific audiences, such as sewing measurements, sample recipes, etc.

Visuals requested include a kit for group use, self-study packet, slides, charts, measuring devices and utensils, teaching tools and techniques such as scales, meter sticks, games, worksheets, updating of "Kilos" program, materials for displays and exhibits.

Need was also expressed for information on cooking and the metric system, especially conversion of recipes from customary to metric.

Over two-thirds (101) of the agents indicated their interest in attending in-service education. Some qualified their "yes" by saying "not this year," "depends on time and schedule," or "at or near the time of actual change."

Summary and Conclusions

As was hypothesized, home economists working with the adult program and agents with responsibilities for consumer education, mass media, textiles and clothing, and food and nutrition are actively involved in metric education. Agents who have acquired metric measuring devices, etc. are more knowledgeable about the metric system than those who have not acquired any devices.

From the results of this questionnaire, it would appear that New York State Extension home economists are ready to accept the challenge of launching extensive and intensive educational programs on metrication.

The feeling of the agents can perhaps best be summed up by these two comments: "It would be nice to have training and be prepared ahead of time instead of after the fact," and "Let's lead the public with the information rather than "bring up the rear" as usual. Let's be the recognized source for this up-to-date information."

The agents' comments, suggestions, and requests were taken into consideration in developing the metric education program.

CHAPTER VI

STRATEGIES FOR TEACHING THE METRIC SYSTEM

> A [communication] strategy operates as a system which includes the purpose, the message, the medium, and the people who are involved. A strategy needs to be considered through time, especially since each activity undertaken will have an irreversible effect on the system (Wolff, 1973, p. 4).

The purposes of the strategies described in this chapter are to create awareness of and interest in the metric system and to get people actively involved in learning and using the metric system.

Implementation will be via mass media and interpersonal channels of communication. Mass media channels are appropriate for creating awareness and interest for four reasons: 1) it has been shown in the review of literature that they are capable of achieving this objective; 2) radio, television, newspapers, and other forms of mass media are generally available in the counties throughout New York State; 3) agents have ready access to the mass media and already use them in carrying out their educational programs; and 4) audiences in the respective counties use the mass media as a source of reliable, up-to-date information from Cooperative Extension.

Interpersonal channels will be used to get people actively involved in learning and using the metric system because: 1) while mass media channels are effective in informing consumers that a new idea exists, according to the review of literature, interpersonal channels are relatively more important in convincing them to try it out (evaluation-trial stages of adoption); and 2) Extension home economists have had previous experience with

conducting classes and workshops (through leader training and direct teaching) and this approach has proved to be successful.

The audiences to be reached include professionals (such as home economics teachers) and paraprofessionals (such as EFNEP aides); and consumers.

Even though at the present time there is no established timetable for conversion of various sectors of the economy to the metric system, it is important for consumers to be aware that the U.S. is going metric and become familiar with the metric system in a general way. It is important, too, that professionals and paraprofessionals not only become aware of the metric system, but also become actively involved in learning and using it so that they will be prepared to teach others. Therefore, during the next year to 18 months, priority should be given to implementing awareness-interest strategies for reaching consumers, and conducting classes and workshops for professionals and paraprofessionals.

In New York State there are now 56 counties with a home economics Extension program. (One county that did not have a home economics program at the time of the survey has recently employed an Extension home economist.)

County situations as well as audiences are unique. Therefore, no attempt was made to design a "package" or "canned" program for teaching the metric system to consumers. Instead, a variety of approaches was developed, based on the review of literature and suggestions from the agents. As change agents, Extension home economists should know their county situations and audiences with whom they work well enough to be able to select and apply the appropriate strategies.

It is hoped that these strategies can serve as a model for teaching the metric system to consumers, not only for Cooperative Extension in New

York State, but in other states as well. When legislation is passed by Congress, there will be national direction and a conversion plan developed by the National Metric Conversion Board. Now, however, even before government action, Extension home economists can play a positive role in implementing the metric system at the local level. It is hoped, too, that the effectiveness of the national Cooperative Extension network and its impressive record over the past 60 years in diffusion of new ideas and practices is taken into consideration when the national conversion plan is being developed. When Sweden switched from left-to-right-hand driving, a field organization was established, consisting of a representative from each county to plan local activities; perhaps Cooperative Extension agents can serve in the same capacity in assisting consumers with adoption of the metric system.

Creating Awareness and Interest

The importance of mass media channels in creating awareness of and interest in a new idea cannot be overemphasized. Rogers and Shoemaker, Beal and Rogers, plus Sweden's public information campaign in switching from left-to-right-hand driving, Great Britain's publicity campaign for conversion to decimal currency, and Australia's awareness program for metrication all illustrate this point very well.

Extension home economists have access to public service time on radio and television. In recent years there has been increased use of the electronic media by the agents, especially as one-minute consumer information spot announcements have become popular. It is the author's opinion that these media can be used even more effectively when agents understand the role that these media play in the adoption process.

Agents also write news releases, by-lined columns, and feature articles for the newspapers published within their respective counties. In addition, each county publishes a monthly newsletter or magazine which is sent to participants in the county Extension program.

In the awareness-interest stages, all forms of mass media can be used to feature general information on the metric system--what it is; how and where it originated; its advantages; why the U.S. is going metric; how easy the metric system is to use; examples to illustrate that the U.S. is already going metric; relationships between metric and customary systems, such as a liter is just a bit bigger than a quart, or a meter is slightly longer than a yard, or the metric system is based on 10 like our money system. To minimize consumer resistance, it is important to gain their confidence from the very beginning and to emphasize the positive. Australia's standard approach is to show how easy the metric system is. Great Britain made the mistake of neglecting the consumer for the first nine years of its conversion period.

Since agents already have established rapport with the local press, it seems logical to suggest that they conduct an awareness program with the women's editor or other staff member who will be handling metric matters, especially in view of the following which recently came to the author's attention:

> Syracuse hospitals use centigrade thermometers for taking patient temperatures with the exception of Upstate Medical Center where measurement is metric (Syracuse Post-Standard, Nov. 1, 1974, p. 17).

The implication here is that centigrade (an obsolete term for Celsius) is not a metric unit of measurement, when in reality it is.

The American National Metric Council has published a Metric Editorial Guide which covers the basic grammatical rules of the metric system and is

designed as a convenient reference guide. This guide could be introduced to local journalists. In Australia, nearly every media organization nominated a staff member to be responsible for reporting on metric matters, while in Great Britain, the Metrication Board hopes to meet with senior journalists, especially those from women's magazines.

Exhibits, displays, and posters can be used effectively to create awareness and interest. A set of posters that can serve as the basis for an exhibit, "Metrics in the Home," is available on loan to the agents from the Department of Design and Environmental Analysis. Posters include: metrics in general, clothing and sewing, food, personal measurements, photography, home workshop, household equipment, and title poster.

Leaflets can provide general information to create awareness or more specific information pertaining to a particular conversion. The National Bureau of Standards has developed a single sheet for consumers called, "All You Will Need to Know about Metric (for Your Everyday Life)." It contains general information about the commonly-used units with which consumers will need to be familiar: meter, liter, gram, and degrees Celsius. Countries such as Great Britain, Australia, and New Zealand, which are in the advanced stages of adoption, have produced leaflets containing detailed information about a specific conversion--such as kitchen metrics and clothing metrics.

Even though it is expected that metric conversion having a direct impact on the consumer would be scheduled in the last half of a national 10-year timetable, Barbrow (1975, pp. 5-6) cautions:

> ...the period between now and M day can and should be used fruitfully by waging a public relations effort via all available media. This effort should be directed toward helping the consumer understand why the nation is converting to metrics. It should assure him, in all frankness, that what little he will need to know about the new measurement units can be learned readily and will not

trouble him greatly. Meanwhile to assure credibility, plans should be made for safeguarding the consumer during the conversion and the consumer should be made aware of these plans.

Knowledge and Understanding Through Involvement

le mass media channels are effective in creating awareness and interpersonal communication channels play an important role in the (application) and trial stages of adoption. In Beal and Rogers' example, mass media channels seemed to be very effective in inemakers that an innovation existed, but were less effective in them to try it out.

er consumers have become aware of the metric system and interested g more about it, they may be ready to try it out. Involvement ning by doing, participating in activities and learning experie best way to learn is by doing; the more involved the students ore they will learn.

re seem to be two levels of involvement--less intense involvement vidual basis and more intense involvement through group activities. ys in which consumers can become involved on their own are many. e Extension may offer a leaflet containing detailed information on ar metric conversion through a newspaper article or on a radio or program. Perhaps the leaflet could have a metric ruler printed le, with which the consumer could try out measuring in metric. A clothing metrics might even have a seam allowance guide to cut sten to the throat plate of the sewing machine.

-teaching guides are also available for consumers who wish to metric system on their own by programmed instruction. Agents t consumers to this possibility, and/or make these guides available.

Extension home economists should be alert for opportunities to cooperate with local businesses and thereby get consumers involved on an individual basis. For example, a department store might feature a promotion on metric measurers. The agent might give an in-store demonstration and prepare a metric recipe. Leaflets with the recipe and information on kitchen metrics could be handed out. If this promotion were conducted in a supermarket, shopping for foods and other items labeled with metric units could be included.

Or perhaps a fabric shop might advertise fabric by the meter. A tie-in promotion could include meter sticks, metric tapes and other sewing aids, and patterns. The Extension home economist might give a demonstration on how to use them and offer a leaflet on clothing metrics.

It might be possible to cooperate in some way with local agencies, organizations, or schools involved with metrication. National Weights and Measures Week in March would offer an excellent opportunity to plan some joint activities with the local department of weights and measures and get consumers involved.

Consumers who are more interested in getting actively involved can participate in group situations, such as classes and workshops--either directly taught by the Extension home economist or in a leader-training session.

In Australia, activity lessons which involved students in practical measuring situations proved to be effective for adults as well. And Bright and Jones (1973, p. 16) found that the approach they developed for teaching the metric system in a fourth grade classroom "has even proven to be reasonably successful in the essential task of helping elementary school teachers develop skill in using metric units."

It is not the author's intent to develop a comprehensive list of learning experiences to incorporate into a meeting or workshop, but to merely give a few examples. Sources for learning experiences include: Penney's Moving Toward Metric; Sears' Educator's Guide to Teaching Metrication; Batcher and Young, "Metrication and the Home Economist"; A Metric Workbook for Teachers of Consumer and Homemaking Education; and American Home Economics Association's Let's Think Metric. (See Bibliography and Metric System Resources in Appendix.)

Suggested Learning Experiences

1. Using a metric tape, determine your bust, waist, hip, and height measurements in centimeters. Then determine your figure type and pattern size from the metric measurement chart.

2. Determine your weight in kilograms on a metric scale.

3. Using a Celsius thermometer, record the temperature of the room, refrigerator, freezer, tap water, etc.

4. Using a Celsius oral thermoneter, take your body temperature.

5. Keep a log of things that have already changed to metric. Add to the log as new items appear with metric units.

6. Make a list of food items on your shelves that are measured in metric. Are the SI symbols used correctly?

7. Weigh 100 grams of each of the following: flour, sugar, dry milk, cooking oil, water, dry flaked cereal, and French dressing. Then measure each ingredient and record the volume. Discuss the differences.

8. Plan an automobile trip to a distant city. Figure the distance in kilometers and speed in kilometers per hour.

9. Determine the capacity (in milliliters or liters) of a juice glass, soft drink bottle, casserole, mixing bowl, etc. by filling the container with measured amounts of water.

10. Prepare a recipe with the quantity of ingredients stated in metric units.

In teaching adults, one should keep in mind that they don't recognize a need for learning unless they will be applying what they learn to an immediate situation. Therefore, teaching should be geared only to that actually needed and one should guard against teaching too far ahead of actual application. Home economics teachers, for example, would see a need for learning the metric system before the general public, and early priority should be given to conducting classes and workshops for them and other professionals.

Educators do not recommend using conversion tables and charts, as they serve as a crutch and prevent people from learning to "think metric." An exception would be a price comparison chart for shopping. As long as there are dual labels and markings, consumers will continue to rely on the customary system. Ideally, metric should be taught as though it were the only system.

Other types of involvement activities are quizzes, pre-tests and post-tests to measure progress; but they should not seem like school tests. Metric games are another suggestion, and there are several on the market.

Personal contacts were most important in Australia in motivating and educating special groups; for example, agricultural Extension agents played a major role in farmers going metric. Extension home economists can fulfill the same purpose with their clientele.

After adoption has taken place, Rogers and Shoemaker suggest that the change agent provide supporting messages to individuals who have previously adopted, much in the same way as Sweden's reinforcement program for four months following switchover.

Rogers and Shoemaker (1971, pp. 260-261) state that the most effective way of reaching people with new ideas and persuading them to adopt these innovations is a combination of mass media and interpersonal channels. For example, a film or set of slides by itself probably can be expected to do little more than create awareness or interest. However, the film or slides may be incorporated into a class or meeting, followed by discussion of its contents, or in the case of a film on the metric system, the group participants may try out for themselves some of the concepts which were shown. Thus, the added dimension of group discussion and/or participation in learning experiences combined with mass media will lead to an increase in adoption.

Special Considerations in Teaching

Clothing Construction

In the area of clothing construction, perhaps the change to the metric system will be easier for consumers than in other areas. In November 1967 (January 1968-dated catalog), the Pattern Fashion Industry (Butterick, Vogue, McCall's, Simplicity) introduced patterns with new measurements and sizes to correspond more closely to standard ready-to-wear sizing. Since patterns with new sizing and patterns with former sizing were featured concurrently (for about two years) in the pattern books, consumers had to become familiar with the new measurements for some pattern purchases and at the same time not forget the old measurements for others. In other words,

consumers were operating with a dual set of measurements. Red charts in the pattern catalogs gave new sizing dimensions and each new sizing pattern was so marked. Former sizing charts were in blue.

At the present time, McCall's is the only pattern company to feature metric as well as customary body measurement charts in their catalogs. In correspondence with the Educational Coordinator at McCall's (November 14, 1974), the author was able to obtain a few copies of their body measurement chart, which had been made up for a promotion, and also learned that McCall's metric activities had come to a halt. The Educational Coordinator wrote to the author saying:

> We do not have any other metric materials as we stopped planning for a metric change in the near future when Congress vetoed a change to metric on May 8 of this year. Our plans for any new materials are now in limbo.

The author was informed by Butterick's Metric Project Coordinator (correspondence, November 14, 1974) that:

> There has been no official policy set by our pattern department as to when patterns will show only metric measurements. At present, our patterns have both customary and metric measurements on the guide sheets.

In her study of introducing the metric system to eleventh and twelfth grade clothing construction classes, McCready (1971, p. 42) points out that she was not able to obtain sufficient metric tools. This should no longer be a problem, as several companies are manufacturing metric tapes, meter sticks, and other types of measuring devices. Also, pattern pieces have both customary and metric measurements. McCready mentions, too, that throat plates need to be marked in centimeters. In a New Zealand publication, Clothing Metrics, authors Laing and Cockburn (1973) comment that:

> The majority of sewing machines available in New Zealand originate from Europe and Japan. This means that their stitch length and needle size is already metric. Some of these machines

> now have imperial measurements on the throat plate, but replacement plates graduated in metric measurements will be available for some machines later in 1973. Measurements marked on the beds of some machines are frequently in centimetres as well as inches.

The author expects that metric throat plates will be available for foreign sewing machines sold in the U.S. For machines with no throat plate markings, a piece of adhesive tape can be placed on the throat plate 1.5 centimeters from the center of the needle hole.

Food Preparation

One of the big concerns in going metric seems to be whether U.S. homemakers will continue to measure dry ingredients by volume or will they weigh them on gram scales, as homemakers in other countries do. Walker (1974, p. 21) has this to say:

> Although there are advantages in using mass [weight] measurements for solid ingredients, ... the wisest choice would be to maintain volume measurements. The rationale for maintaining volume measurements is that it is a plausible assumption that the average homemaker is not going to invest in, or use a gram scale. Weighing ingredients is a totally different cooking concept, and confusing for some. It is important to stress the fact that mass measurements are easier, but this option will be left to the homemaker.
>
> In support, a task group on Metrication of Household Measures, sponsored by the American National Standards Institute, has offered the following recommendation: "Provision for measurement of liquid and dry ingredients by volume for home food preparation of food should be continued when conversion to the metric system of measurement occurs in the United States."

Hanson (1974, p. 2) comments:

> ...there are hard questions still to be answered. One relates to mass-versus-volume measurements in kitchen practice. Here the experts seem to be coming down in favor of volume.

Another question which arises frequently is how to convert customary recipes into metric. In their leaflet, Kitchen Metrics, Australia's Metric Conversion Board has a simple answer:

> DON'T! The conversion factors are not simple and you might end up with a flop.
>
> Guidelines have been set by a panel of experts to help home economists and cookery editors in converting recipes. Many, but not all, of the metric recipes now appearing have been prepared following these guidelines.

The leaflet goes on to tell how to recognize a "good" metric recipe:

> A "good" metric recipe will have easy-to-follow quantities which rely largely on cup and spoon measures.
>
> Unfortunately, some writers have not yet applied the guidelines set down by the panel of experts and offer "imperial" recipes converted exactly to "metric." Avoid recipes giving ingredients in amounts such as 568 ml, 227 g, and oven temperatures like 93.3 °C. Such accuracy is more appropriate to the laboratory and could not be achieved in the average kitchen.

Australia's Kitchen Metrics leaflet also gives a good rule of thumb for converting oven temperatures from Fahrenheit to degrees Celsius--halve Fahrenheit temperatures for Celsius. For example, 400 °F becomes 200 °C.

New Zealand's Kitchen Metrics bulletin informs homemakers:

> For much of your cooking, you can use your own familiar recipes and methods. You will make tea, scramble eggs, chop a medium onion, bake stuffed apples and so on, just as you have always done, even though you bought the ingredients in kilograms, grams and litres.
>
> It is only when exact proportions are required as in baking and jam making for instance that weights and measures become necessary. Even then, you could continue to use your old recipes with the same measuring cups, spoons and weights. This is not the best solution however, as it would limit you to the recipes you know. The fun of trying out new dishes is lost if you do not know the drill. Metric units tie in very closely with the old system, and you will adjust very quickly. So move with the times, be modern and cook the metric way.

Their leaflet gives examples of how to convert present recipes to metric.

Great Britain's Going Metric in the Kitchen leaflet advises homemakers to:

> Measure directly in metric. It is a waste of time and effort to calculate in ounces, inches or pints and then convert.

and assures them that:

> ...there is no need to throw away recipes, scales or other kitchen equipment just because they are in ounces or pints. It is easy to weigh out pounds and ounces from metric food packs. It is just as easy to weigh out in metric from traditional food packs.

Metric measurers for liquids (or metric measuring jugs, as they are called in England and New Zealand) are now available. Foley Manufacturing Company's 250 milliliter plastic cup also has customary measurements; Corning Glass Works is marking its one-cup and two-cup PYREX measurers also in metric--250 and 500 milliliters. As yet, there seem to be no sets of single capacity measurers for dry ingredients or metric measuring spoons readily available. Many decisions regarding measuring equipment will have to be made by industry groups, American Home Economics Association, and standards committees.

No wonder going metric in the area of food preparation is confusing! The author feels that even though homemakers will be buying food in metric quantities, they will continue to use favorite customary recipes, supplemented by new metric recipes. It will be necessary to either have two sets of measuring equipment (one customary, one metric) or one set labeled in both systems--at least for the present generation of homemakers. In other words, the rule of reason applies in the kitchen as well as to industry.

Integration of Metric System into Ongoing Programs

Besides offering workshops on the metric system, the author feels that the metric system should be incorporated whenever possible into existing programs--food preparation, food shopping, consumer buying, construction of clothing and home furnishings, etc. In Australia, this approach was successful, even in the early stages of metrication when there was lack of interest in metric conversion courses. There may be less resistance to converting to the metric system if it is not treated as a separate program.

Even though this metric education program has been designed for adults, the author recognizes that youth who are learning the metric system in school need to have it reinforced elsewhere. In the 4-H program, integrating the metric system into the existing projects can serve this purpose. Avoid the situation in England where the children forgot the metric system because they learned it before there were practical applications in daily life to reinforce the in-school instruction.

It must be remembered that older 4-Hers will not have had the benefit of learning the metric system in elementary school. According to McCready (1971, p. 41):

> It is important to provide upper level students, who have had little previous experience with the metric system, with the basic background on how the metric system is constructed and used. They must have an understanding of the system of tens, how to multiply and divide by using decimals, and the interrelationship between volume, mass (weight), area and linear measure.

In-Service Education

Childers and Vajrathon (1970, p. 3) stress the importance of planned support communication in launching a new program involving change. The first phase (before mass communication by mass media) should be to provide change agents with:

> ...quite specific, planned information about (and even motivation for) this project--the need for it, the objectives, its channels of implementation, its time-phases, etc.

They further emphasize that briefing should include more than "issuing one more set of stencilled instructions and nothing else." Change-agent trainees (Extension workers) need teaching materials and communication aids which they can learn to use and take away to help them carry out their role in the adoption process, and they need to see samples of the materials which have been designed for their clientele. The support communication

program must be an integral component of the project itself--pre-planned and fully-budgeted.

A half-day in-service education opportunity (ISEO), "The Metric Maze," was conducted by the author in December 1974. It was coordinated with other in-service programs being offered at Cornell University for the agents during that week. According to the registration, "The Metric Maze" was attended by 56 Extension home economists from 29 counties, plus 10 faculty and staff representing three departments in the College of Human Ecology.

The content of the program included: 1) the U.S. in a metric world (an overview to bring agents up to date), taken from Chapters I and II of this thesis, accompanied by 25 slides from the National Bureau of Standards set, "What About Metric?"; 2) the adoption of a new idea, from Chapter III; 3) the International System of Units (SI); 4) the language of metrics (rules for writing metric quantities, typewriting recommendations, etc.; and 5) resources and suggestions for teaching, adapted from this chapter.

Three films ("The Meter," "The Liter," and "The Kilogram") were shown; also filmstrip and cassette, "The Metric Song"; and cassette of radio script. Kits, charts, and exhibits were on display. Folders of reference materials were distributed. (See Appendix for Metric System Resources and Materials in Agents' Folders.)

Because of time and other limitations, it was not possible to incorporate a learning-activity session into this in-service. The author expects that as the U.S. continues to move toward metric, there will be a need for additional in-service. There will be new agents on the staff and other counties will incorporate this topic into their county programs. As the agents themselves move from the awareness-interest stages to the evaluation (application) and trial stages of adoption, learning experiences will be especially important.

No formal evaluation of the ISEO was conducted at the time of presentation because the author felt that it would be premature until the agents have had an opportunity to implement the program. Verbal feedback and several unsolicited letters from agents who attended indicate that:

> ...[it] was a really super ISEO....It answered many broad questions, plus offering resources for specific ones.
>
> .....
>
> The material was marvelous and will be easily and readily adapted to the county situation. It is helpful to have a person give the program who knows what county situations are like.
>
> .....
>
> It was one of the best, if not the best, in-service education programs we've attended in some time.... You were well-prepared; the material presented pertinent; and attitude toward county programming relevant.

It is recognized that the in-service education program conducted for the Extension home economists is only a beginning. Its purpose was to make agents aware of the many things that are happening on the metric front, create interest and enthusiasm in metric education, and provide them with resources and suggestions for teaching.

Metric education is included in the Department of Design and Environmental Analysis's program suggestions to the counties for developing plans of work for 1975-76. It is anticipated that this will be an ongoing program for several years. Future in-service education programs should be in more depth and should include the opportunity for agents to participate in activities and learning experiences.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Adoption of the metric system has been under consideration in the U.S. for almost two centuries. In 1866, the use of metric weights and measures was legalized by Congress; this meant that the metric system was not made compulsory, but that Congress permitted its use. The 1971 Metric Study Report recommended a change to the metric system. National legislation to initiate the change was introduced in the last two sessions of Congress, but was not passed.

Today, over 90 percent of the world's population uses the metric system of measurement, and the U.S. is the only industrialized nation not yet metric or officially committed to going metric. That is not to say, however, that the U.S. is not moving in the direction of the metric world.

As was pointed out in Chapter II, Congress did pass and the President signed into law the Education Amendments of 1974, providing financial support in establishing metric education programs. In a number of states, metric legislation is being introduced or has already been passed. Major multinational corporations are converting to the metric system and consumer-oriented industries are beginning to go metric. Much evidence was cited.

With or without a coordinated plan, the U.S. is moving toward metric. Most experts agree that it is only a matter of time before the U.S. officially converts to the metric system.

Although the present emphasis is on teaching the metric system to children and to adults for vocational purposes, it is recognized that early

priority should be given to educating the general public to think in metric terms. Adult educators and home economists are among those being challenged with this responsibility.

Cooperative Extension has a responsibility for continued leadership in informal educational programs and one of this organization's major program areas is consumer well-being. Extension home economists can play a positive role in implementing the metric system at the local level.

A survey of the Extension home economists in New York State indicated that agents are beginning to include the metric system in their plans of work. More than half of the agents have acquired metric measuring devices, conversion charts, etc., and two-thirds of the Extension home economists were able to give two or three examples of the metric system in their everyday lives. The results of the questionnaire also revealed that agents are concerned about how to teach the metric system.

Adoption of the metric system by consumers is a type of change affecting everyday life and it seems to be a part of human nature to resist change. For determining the most successful strategies to incorporate into an educational program to assist consumers in adopting the metric system, four areas of literature were reviewed: 1) experiences in other countries now going metric; 2) recent changes of a comparable nature--Great Britain's conversion to decimal currency and Sweden's switch from left-to-right-hand driving; 3) adoption of a new idea and the role of the change agent in the adoption process; and 4) characteristics of adult learners and factors to consider in designing continuing education programs for adults.

The literature indicated that mass media channels of communication are relatively more important in creating awareness of and interest in a new idea, while interpersonal channels are relatively more important at the evaluation and trial stages of adoption.

the awareness-interest stages, all forms of mass media can be used general information on the metric system. Exhibits, displays, rs can be used effectively to create awareness and interest. tension home economists also have access to public service time on television; and they write news releases, by-lined columns, and rticles for the newspapers published within their respective coun- addition, each county publishes a monthly newsletter or magazine sent to participants in the county Extension program.

ter consumers have become aware of the metric system and interested ng more about it, they may be ready to try it out. Classes and conducted by the Extension home economists are an effective method g understanding of the metric system through involvement on a group volvement means learning by doing, participating in activities and xperiences; some examples were given in Chapter VI. There are ways to involve consumers on an individual basis and suggestions und in Chapter VI.

ormal contacts with friends, neighbors, and relatives who have application and trial stages of adoption are important in gain- tance of the metric system. Once the adoption process gets under- ntinues to generate itself due to early adopters influencing their

most effective way of reaching people with new ideas and persuad- o adopt these innovations is by using a combination of mass media ersonal channels.

Implications for Other Extension Programs

The mission of Cooperative Extension is to help individuals and families improve their quality of living. To do so necessitates bringing about change. New ideas and practices must be adopted.

The author feels that the review of literature on adoption of a new idea and guidelines for teaching the metric system as outlined in this thesis have application to designing future Extension programs involving change. In order to plan and implement successful programs, Extension home economists need to understand the concepts of the adoption process, adopters and their characteristics, and the role of various communication channels in the adoption of a new idea.

Rogers and Shoemaker emphasize that to maximize the probability of adoption, "communication channels must be utilized in an ideal time sequence, progressing from mass media to interpersonal channels." If inappropriate channels are used in the awareness-interest stages, the spread of knowledge and information will be slowed down and adoption will be delayed. Even though Extension home economists continually utilize mass media and interpersonal channels of communication in various ways, it is important for them to recognize that each has distinguishing characteristics which make one more appropriate than the other for certain tasks during the stages of adoption.

The pattern of using mass media to provide general information about a new idea or practice and create a favorable attitude toward it, followed by interpersonal communication sources such as meetings, workshops, and informal contacts containing more specific information and learning experiences to reinforce an individual's beliefs about the innovation can be applied to other Extension programs. The agent must be sensitive to the needs of the clientele in her county, and adapt this approach to the local situation.

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APPENDIX

"PEANUTS" GOES METRIC

PEANUTS
"THE METRIC SYSTEM IS EASY TO LEARN AND UNDERSTAND"
HA!
"TIME SAVED IN TEACHING CERTAIN CONCEPTS CAN BE DEVOTED TO TEACHING MORE IMPORTANT CONCEPTS AND SKILLS"
HA!
HOW CAN I EXPLAIN ANYTHING TO YOU IF YOU KEEP SAYING, "HA!" ALL THE TIME?
HUH?
PEANUTS
A CENTIMETER?
IF ANY CENTIMETERS COME CRAWLING INTO THIS ROOM I'LL STEP ON 'EM!
HAHAHAHA!!
YES, MA'AM
PEANUTS
"THINK METRIC" PASS IT ON!
"THINK METRIC!" PASS IT ON!
"THINK METRIC!" PASS IT ON!
AAUGHH!

COOPERATIVE EXTENSION NEW YORK STATE

Cornell University • State University of New York • U.S. Department of Agriculture

Cooperative Extension Programs
Martha Van Rensselaer Hall, Ithaca, New York 14850

April 11, 1974

TO: Extension Home Economists - Adult and 4-H

FROM: Regina Rector, Department Extension Representative,
Design and Environmental Analysis Department

The metric system is coming! Even though proposed legislation has not yet been passed, interest is growing. Do you have sufficient information and back-up material to answer questions and solve problems that may arise?

The purpose of the enclosed questionnaire is to help us in designing an educational program concerning the metric system that would be useful to you in conducting your county programs. We hope that you will take the time to answer these few questions. We need your ideas and suggestions.

Connie Adams, former Extension Home Economist in Dutchess County, is planning and conducting this study as part of her master's program in the Department of Communication Arts. We are pleased that Connie has chosen this very timely topic for her special project, and we are sure that it will benefit all Extension personnel.

Please return the questionnaire to her at the given address by April 25.

We are looking forward to hearing from you.

New York State College of Agriculture and Life Sciences, New York State College of Human Ecology, and New York State Veterinary College at Cornell University, Cooperative Extension Associations, County Governing Bodies, and United States Department of Agriculture, cooperating.

New York State College of Human Ecology
A Statutory College of the State University
At Cornell University, Ithaca, New York

QUESTIONNAIRE ON THE METRIC SYSTEM

Please return to: Ms. Constance C. Adams
Dept. of Communication Arts
404 Roberts Hall
Cornell University
Ithaca, New York 14850 DEADLINE: April 25, 1974

1. How long have you been in Extension?_____

2. Do you presently work with: (check)

_____4-H, youth program _____both
_____adult home economics program

3. For what part(s) of the county program are you responsible?_____

_____

4a. Do any line items in your 1974-75 Plan of Work include activities pertaining to the metric system?_____

b. If so, specifically what is planned, for what audience, etc.?_____

_____

_____

5a. In the past year have you had any requests for programs about the metric system?_____

b. If so, from what group(s)?_____

c. Did you present a program?_____

d. If so, briefly describe what you did, visuals, handouts used, etc.

_____

_____

6a. Are you familiar with the slide program, "The Kilos are Coming"?_____

b. Have you ever used it in teaching?_____

c. Does your county own this slide program?_____

7a. Have you acquired any metric measuring devices, conversion charts, etc.?_____

b. If so, what? Please be specific and give brand names, if possible.

_____

_____

8. If you took your temperature when you were feeling well, you would expect the thermometer to register:

   (a) 41 °C (b) 30 °C (c) 37 °C

9. The speed limit on highways in New York State is:

   (a) 55 kilometers per hour (b) 70 kilometers per hour (c) 90 kilometers per hour

10. If you were serving hamburgers to a family of 4, allowing 1 hamburger each, how much meat would you buy?

    (a) 250 grams (b) 450 grams (c) 1 kilogram

11. In buying gasoline by the liter rather than by the gallon, would you

    (a) buy more liters than gallons?

    (b) buy less liters than gallons?

    (c) buy the same amount of liters as gallons?

12. Even though the United States has not formally "gone metric," there is evidence of the metric system in our everyday lives. Can you give 3 examples?

    1._____

    2._____

    3._____

13. Would you be interested in participating in a workshop (ISEO) on the metric system?_____

14. What types of information and materials would be useful to you?_____

    _____

    _____

    _____

    _____

    _____

    _____

15. Please list here any questions you have been asked, comments you may have, etc.

County_____

Name (if desired)_____

THANK YOU!

Table 1. Number of years in Extension by type of Extension work

Years	Type of Extension work				
	Adult	4-H	Both	No information	Total
	Number of agents				
Less than 1 year	9	4	6		19
1 - 5 years	32	19	10	1	62
6 - 10 years	16	7	6		29
Over 10 years	13	7	6		26
Total	70	37	28	1	136
	Percent				
Less than 1 year	13	11	21+		14
1 - 5 years	46	51	36	100	46
6 - 10 years	23	19	21+		21
Over 10 years	18	19	21+		19
Total	100	100	99*	100	100

*Total not 100 percent because of rounding.

Table 2. County program responsibilities by type of Extension work

Program areas	Type of Extension work			
	Adult	4-H	Both	No information
	Number of agents			
Consumer education, mass media--alone or in combination with other program areas; all, general home economics	35			
Other program--textiles and clothing, food and nutrition, ENEP, but not including consumer educat on or mass media	29			1
All home economics program--including textiles and clothing, food and nutrition, ENEP, consumer education		32	23	
Administration, program planning or leadership, family life, child development, CRD	4	4	4	
No information	2	1	1	
Total	70	37	28	1

Table 3. Requests and plans for metric education programs

Program areas	Program requests 1973-74		Program plans 1974-75	
	Number	Percent	Number	Percent
Adult (70)				
Consumer education (35)	10	29	8	23
Other program (29)	11	38	1	3
Administration (4)	2	50		
No information (2)	1	50		
4-H (37)			1	3
Both (28)				
Program (23)	3	13	7	30
Administration (4)	1	25		
No information (1)	1	100		

Table 4. Use of 1969 slide program, "The Kilos are Coming"

Program areas	Agents who are familiar with program		Agents who have used program in teaching	
	Number	Percent	Number	Percent
Adult (70)	38	54	8	10
4-H (37)	9	24	1	3
Both (28)	8	28	5	18

Table 5. Acquisition of metric measuring devices and conversion charts

Program areas	Agents who: Acquired metric devices		Had not acquired metric devices	
	Number	Percent	Number	Percent
Adult (70)	41	58	29	42
4-H (37)	18	48	19	52
Both (28)	15	54	13	46

Table 6. Practical applications of the metric system to everyday life

Program areas	Agents who: Answered questions 8, 9, 10, 11 correctly: Metric devices		No metric devices		Gave 2 or 3 correct examples of metric system	
	Number	Percent	Number	Percent	Number	Percent
Adult	14	34	5	17	50	71
4-H	5	28	2	10	21	57
Both	7	47	2	15	22	78

MATERIALS IN AGENTS' FOLDERS

National Bureau of Standards publications:

"All You Will Need to Know About Metric (for your everyday life)"--Letter Circular 1052 and chart

"Brief History of Measurement Systems" with a chart of the Modernized Metric System

Metric Conversion Factors--Letter Circular 1051

Metric Conversion Card

"NBS Policy for Usage of SI Units"

McCall's Metric Conversion Chart

FDA Consumer Memo, "Metric Measures on Nutrition Labels"

Sears, "An Educator's Guide to Teaching Metrication"

Materials prepared by the author:

The Language of Metrics

The Metric System--radio script

Metric System Resources

"The Consumer and Metrics"

Recipes

NEW YORK STATE COLLEGE OF HUMAN ECOLOGY
A STATUTORY COLLEGE OF THE STATE UNIVERSITY
AT CORNELL UNIVERSITY, ITHACA, NEW YORK

THE LANGUAGE OF METRICS

The metric system is an international language of measurement. Its symbols are identical in all languages. Just as the English language is governed by rules of spelling, punctuation, and pronunciation, so is the language of measurement.

RULES FOR WRITING METRIC QUANTITIES

1. Capitals

   a. Units: When written in full, the names of all units start with a lower case letter, except at the beginning of a sentence. Note that in degree Celsius, "degree" is lower case but "Celsius" is capitalized. The "degree centigrade" is now obsolete.

   b. Symbols: Unit symbols are written with lower case letters except that the first letter is upper case when the name of the unit is derived from the name of a person.

   c. Prefixes: All symbols for numerical prefixes are written with lower case letters (except for tera (T), giga (G), and mega (M). All prefixes are written in lower case letters when written out in full, except where the entire unit name is written in upper case letters.

   Examples:

For meter	write m	For milliliter	write ml
For millimeter	write mm	For volt	write V
For kilometer	write km	For ampere	write A
For gram	write g	For watt	write W
For kilogram	write kg	For kilowatt	write kW
For second	write s		
For liter	write l		

2. Plurals

   a. When written in full, the names of units are made plural when appropriate. Fractions (both common and decimal) are always singular.

   b. Symbols for units are the same in singular and plural (no "s" is ever added to indicate a plural).

   Examples: 55 kilometers OR 55 km
   2.5 grams BUT 0.5 gram

3. Periods

A period is NOT used after a symbol, except at the end of a sentence.

Example: The field measured 350 m by 125 m.

4. The decimal point

In the U.S. the dot is used as the decimal point and is placed on the line. (In some countries, the dot is used at midline, while the decimal comma is in widespread use outside North America.) When writing numbers less than one, a zero must be written before the decimal point (because of the possibility that the decimal point will be obliterated or overlooked).

Example: The oral expression "point seven five" should be written 0.75

5. Grouping of numbers

a. Separate digits into groups of three, counting from the decimal sign. The comma should not be used. Instead, a space is left to avoid confusion, since many countries use a comma for the decimal point.

b. In numbers of four digits, the space is not recommended, unless four-digit numbers are grouped in a column with numbers of five digits or more.

Examples: For 4,720,525 write 4 720 525
For 0.52875 write 0.528 75
For 6,875 write either 6875 or 6 875

6. Spacing

a. When writing symbols or names for units having prefixes, no space is left between letters making up the symbol, or the name.

Examples: kW, kilowatt cm, centimeter

b. When writing a symbol after a number to which it refers, a space must be left between the number and the symbol.

Examples: 22 mg, 16 mm, 20 ^{o}C

7. Squares, cubes, etc.

When writing symbols for such units as square meters or cubic decimeters, the correct method is to write the symbol for the unit, followed by the superscript ^{2} or ^{3} respectively.

Examples: For 14 square meters, write 14 m^2
For 26 cubic decimeters, write 26 dm^3

8. The word "per"

When the word "per" forms part of the name of a unit (e.g., meters per second), the symbol requires an oblique stroke.... Such abbreviations as k.p.h. or kph for kilometers per hour should be avoided.

Example: For 75 kilometers per hour, write 75 km/h
Write 75 kilometers/hour only when there is a space limitation

TYPEWRITING RECOMMENDATIONS

1. Superscripts

These are used to denote square, cube, degree. With an ordinary keyboard, figures and the signs + and - can be raised to the superscript position by rolling the platen half a space before typing the figure. When this is done, the figure may tend to run into the text in the line above. This can be avoided by using care. In printing, this is avoided by making superscripts of smaller type than the body of the text, but this can be done with a typewriter only by modifying the keyboard.

2. The letter "l" for liter

On most typewriters there is no difference at all between the lower case "l" and the figure "1". Since the former is the recognized symbol for liter, which is an everyday metric unit, it is preferable to spell the word in full. However, it is in order to use ml for milliliter, since there is then no longer any possible confusion. It is hoped that eventually a better symbol will be developed for liter, using existing characters.

3. Typewriter modification

A special type-ball with metric symbols is available--e.g., square, cube, degree, micro, ohm. Some typewriters have keys that are readily changed by hand to other characters.

SPELLING

Americans are used to seeing "meter" and "liter." The British spellings are "metre" and "litre." Some U.S. technical groups have recently adopted the British spellings in the hope that there may be worldwide uniformity in the English spelling of these units of the International System. The American National Metric Council's Metric Practice Committee is addressing this question and has asked its Metric Advisory Panel, composed of 75 to 100 leaders in the field, to provide guidance.

PRONUNCIATION

All SI prefixes are accented on the first syllable. It is recommended that the accent fall on the first syllable of the word "kilometer" to be consistent with other metric terms.

Adapted from: "Metric Editorial Guide," American National Metric Council, 1625 Massachusetts Avenue NW, Washington, D.C. 20036. (Single copy $1.50; 10 or more, $0.75 each; 100 or more, $0.50 per copy); plus other sources.

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AT CORNELL UNIVERSITY, ITHACA, NEW YORK

THE METRIC SYSTEM

Radio Script
by Shelley E. Page
Communication Arts Student

CHANT WITH THREE VOICES: Gram, liter, Celsius, meter. Gram, liter, Celsius, meter. Gram, liter, Celsius, meter.

(SIMULTANEOUSLY--ONE VOICE): Ton, foot, mile, ounce, cup, inch, pound, quart, Fahrenheit.

ANNOUNCER: Did you ever find yourself saying, "I've got to cut this recipe in half? What's one-half of one-third cup of sugar--there's no sixth of a cup.... Or did you ever try to remember how many ounces are in a pound? Or pints in a gallon? Or feet in a mile? Or how many barleycorns in an inch? By the way, there are three barleycorns in an inch. That's how the first inch was measured. But, you say, no two barleycorns are alike--how can an inch be an accurate measure? Well, that's the problem--our present measurement system is based on unprecise, confusing numbers like five-thousand-2 hundred-80, 16, and 3. There is another way to measure--it's the metric system.

METRIC SONG TO MUSIC:

ANNOUNCER: All units of metric measure are based on 10. Any basic metric unit is multiplied by 10 to get a larger unit. Or divided by 10 to get a smaller unit. You can also multiply or divide by 100 and one-thousand to get even larger or smaller units. That's a lot easier and quicker than multiplying by 12 or dividing by 16.

Let's look at how things are measured in the metric system. Weight (mass) is measured in grams. Think of a gram as the weight of one raisin.... Pretty small, right? When weighing larger things, use kilograms which are one-thousand grams.

Consider length.... In metric, length is measured in meters. A meter is slightly more than one yard--the height of a doorknob. Think of the width of a paper clip--that's one centimeter--one-one-hundredth of a meter. And a millimeter, one-one-thousandth is even smaller. An average cigarette is one-hundred millimeters. For long distance, use a kilometer. That's one-thousand meters.

A liter measures volume. Think of a little bit more than one quart of milk... that's a liter. A milliliter, one-one-thousandth of a liter, is the last of

the coffee in the bottom of your cup. Temperature is measured in metric, too--degrees Celsius. Water freezes at zero degrees Celsius and boils at one-hundred degrees Celsius. You'd have a normal body temperature at 37 degrees and room temperature is a comfortable 20 degrees Celsius. And that's all there is to metric measuring--grams, liters, Celsius, and meters! And it's all based on 10. So, you say, who cares if our measuring system is old fashioned and inaccurate? We're used to it and it works just fine.

But wait--Did you know that the U.S. is the only large country still using this old form of measuring? Almost all other countries use the metric system. If the U.S. continues to trade worldwide, we must adopt the system other countries use. No one will want to buy a pound of nails in a world of kilograms. Also, wouldn't it just be easier to measure everything with a system based on 10? Think of the time we'd save in schools. Kids wouldn't have to memorize hard numbers and inconsistent units. Metric makes measuring easy for everyone!

The metric system isn't all new, either. I'll bet you've been using some metric measures and didn't even realize it! Like 35 millimeter camera film...180 centimeter snow skis.... Some things are measured both ways like grams and ounces on food labels, centimeters and inches on sewing patterns, distance in kilometers and miles....

Gradually, metric will measure more and more in America. Keep on the lookout for metric--it's coming soon! And you'll be prepared if you remember gram, liter, Celsius, and meter.

METRIC SONG TO MUSIC FADING OUT AT END:

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METRIC SYSTEM RESOURCES

FILMS, SLIDES, FILMSTRIPS

The Metric Song

1974. $4.00. #84575. Educational Relations, J.C. Penney Company, Inc., 1301 Avenue of the Americas, New York 10019 (allow 4 weeks). Also available from local Penney store on loan.

Filmstrip (32 frames) and cassette present the story and language of metric in a lively contemporary manner.

What About Metric

1974. $12.00. National Audiovisual Center (GSA), ATTN: Order Section (S), National Archives Building, Washington, D.C. 20409. Make check payable to National Archives Trust Fund. Also available for free loan from: Association Sterling Films, 866 Third Avenue, New York 10022.

A 70-slide-tape presentation designed for the business community. It discusses briefly the current state of metric conversion in the U.S. and offers some specific examples of how businesses are handling the conversion.

Meters-Grams-Liters

1974. Metrication Institute of America, 1825 Willow Road, P.O. Box 236, Northfield, Illinois 60093. Phone 312-446-4153. Four films (16 mm, 8 mm, video-cassette):

1.	Meters, liters, and kilograms	$31 rental	$310 purchase
2.	The meter	15	150
3.	The liter	9	90
4.	The kilogram	15	150
	Package price	65	650

Planned so that their audiences may see how long a meter is, grasp how much a liter contains, feel how much a kilogram weighs--and perceive the physical relationships between measures for length, volume, and weight. There are constant size references using familiar objects of known size, with people being especially important in providing these scales. The metric system has been treated as if there were no other system.

EXHIBIT

Metrics in the Home

1974. On loan from Department of Design and Environmental Analysis, New York State College of Human Ecology.

Set of posters depicting: metrics in general, clothing and sewing, food, personal measurements, household equipment, photography, home workshop.

EDUCATIONAL KITS, PORTFOLIOS, ETC.

Moving Toward Metric

Insights into Consumerism, Fall/Winter 1974. $1.25. #84573. Educational Relations, J.C. Penney Company, Inc., 1301 Avenue of the Americas, New York 10019 (allow 4 weeks).

This portfolio is designed to develop an awareness as to why the United States is becoming a metric nation and to help consumers accept and understand the basics of metric. Contents include: learning experiences, visuals, aids for conceptualizing metric units, and information progressing from the simple to the complex with regard to metrication.

Metric Match-Ups

1974. $7.00. Corning Glass Works, Product Information Department, Building E-1, Corning, New York 14830 (allow 4-6 weeks).

The kit is designed to help home economists understand and explain to others metric measurements in the kitchen. Kit contains: 2 PYREX metric measuring cups--250 ml (1 cup) and 500 ml (2 cup); 4 overhead transparencies; 6 spirit masters (including recipes); wall chart; 8-page teacher's guide.

Metric Recipe Kit

1974. $5.75 (12 or more kits--$5.50 each). Teaching Kits Co., 468 South 300 West, Tooele, Utah 84074. Add $1.00 for shipping.

This kit consists of: Metrics in the Kitchen--Minnesota Extension Bulletin; Metric system workbook--history of metric system and how to use it; measuring spoons--1, 5, 15, 100 ml; Foley measuring cup; recipes--2 sets available (specify): 1) beginning--single serving, 4-6 servings; 2) advanced--for experienced students or women--simple basics, soups and sauces, breads and cereals, salads and vegetables, main dishes, desserts.

Let's Think Metric

1974. $2.00. American Home Economics Association, 2010 Massachusetts Avenue NW, Washington, D.C. 20036.

Self-instruction learning package for junior and senior high home economics students. Designed to acquaint the student with the basic metric resources commonly used in everyday living, to offer practice in converting from customary to metric, and to suggest ways by which the student can start to think in metric terms.

A Metric Workbook for Teachers of Consumer and Homemaking Education

1973. $1.50. Orange County Department of Education, Box 11846, Santa Ana, California 92711.

Geared for the daily activities of the American home. Emphasizes learning by doing: includes activities, ideas for displays and bulletin boards, conversion charts, source of supplies, transparency presentation, etc.

CHARTS, POSTERS, CONVERSION CARDS

Metric Conversion Cartoons

$3.00 a set. American National Metric Council, 1625 Massachusetts Avenue NW, Washington, D.C. 20036.

Set of 4 cartoons--length, temperature, volume, mass. Printed in olive green, buff, red, and dark blue. Suitable for bulletin board or metric display.

Metric Conversion Card (wallet card) and wall chart, "The Modernized Metric System

These NBS resources have been reprinted by the United States Army Reserve, Army Recruiting Command, and Army ROTC for school distribution. Available free upon request to nearest Army representative.

BOOKS

Prepare Now for a Metric Future

1970. By Frank Donovan. Now available in paperback for $1.25. Popular Library, 600 Third Avenue, New York 10016.

Interesting narrative of the why, how, and what of the history of the metric system.

Thinking Metric

1973. By Thomas F. Gilbert and Marilyn B. Gilbert. $2.95. John Wiley and Sons, Inc., 605 Third Avenue, New York 10016.

This self-teaching guide is designed for those interested in learning the metric system by programmed instruction. Teaches students to think in metric directly, without converting. Includes practice problems and exercises.

SOURCES OF RECIPES

Metric Match-Ups Kit--Corning Glass Works

Metric Recipe Kit--Teaching Kits Company

Forecast for Home Economics, March 1974, p. F-16

American Metric Journal, July/August 1974, pp. 22-23

SOURCES OF EQUIPMENT

Catalog of Metric Instructional Materials

October 1974. $1.50. Metric Studies Center, American Institutes for Research, Box 1113, Palo Alto, California 94302.

Sources of measurement devices for length and area, volume, mass, temperature; other aids for metric instruction; list of suppliers.

Metric Aids Catalog
Free. Dick Blick Company, P.O. Box 1267, Galesburg, Illinois 61401.

Metric teaching aids of all kinds, photographed in color.

METRIC ORGANIZATIONS

American National Metric Council
1625 Massachusetts Avenue NW, Washington, D.C. 20036.

Voluntary, nonprofit organization established in 1973 by American National Standards Institute to serve as a coordinating center for metric activities in the industrial and commercial segments of society (in the absence of a government-sponsored Metric Conversion Board). Publishes Metric Reporter, biweekly, $25 a year, individual subscriber; important metric developments as they occur in Congress, government, education, and business fields. Also publishes Metric Editorial Guide, and other special publications.

U.S. Metric Association, Inc.
Sugarloaf Star Route, Boulder, Colorado 80302.

For 59 years this organization has been an invaluable source of information on the metric system and a leader in the promotion of a metric America. Publishes quarterly newsletter, Metric Association Newsletter, $3 a year.

Metric Information Office
National Bureau of Standards, Washington, D.C. 20234.

Louis E. Barbrow and Jeffrey V. Odom, two of the key people who conducted the U.S. Metric Study, head this office.

PUBLICATIONS

Metric News, bimonthly, $5 a year. Published by Swani Publishing Company, P.O. Box 248, Roscoe, Illinois 61073.

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THE CONSUMER AND METRICS

by Dr. Doris E. Hanson
Executive Director, American Home Economics Association
in Metric Reporter, November 15, 1974

There is a tendency to want to excuse ourselves from hard questions in the consumer area by saying something about the homemaker's reluctance to change. What we mean, usually, is that we're hung up on the idea of cups and spoons ourselves.

My observation, after about five years of involvement in metric discussions, is that the consumer sector is quite open to metrication. The consumer is used to change, used to absorbing pass-along costs, and used to a more complex and confused measurement system than any conversion could possibly create. In fact, the consumer learns and adapts quickly.

We should continue to talk to the consumer about the metric system and its scientific base and its logic, but at the same time we need to work faster to consolidate our thinking and planning in order to minimize the chaos that is already beginning to be evident.

Many metric designations and devices are appearing in the marketplace. Not all represent consensus, and many actually represent incorrect usage. The consumer can survive this confusion for awhile, and hopefully, the ultimate reward will be a brilliant, efficient system.

However, there are hard questions still to be answered. One relates to mass-versus-volume measurements in kitchen practice. Here the experts seem to be coming down in favor of volume. Another difficult question is whether to invent a common language for certain measuring devices (such as cup and spoon) or to stick with the discipline of using grams and millilitres. Also, there's negotiating to do on common modules for housing, furnishings, and equipment--and some decisions to make that cut across all segments of the clothing and textile world. Finally, WHO makes these decisions?

Industry groups are working and thinking about the questions. The American Home Economics Association has committees working. The ANMC (American National Metric Council) Consumer Products Coordinating Committee is providing leadership. It would be a joy to think that our transition to metric could result in a near-perfect total system from the consumers' point of view, as well as meet industry objectives.